



FRIDAY, APRIL 14, 1876.

The Westinghouse Automatic Brake.

In the *Railroad Gazette* of September 9, 1871, elaborate illustrations and a full description were published of THE WESTINGHOUSE ATMOSPHERIC BRAKE as it was first introduced in this country. In its original form it consisted of an air pump operated by a steam cylinder on the engine. This pump forced air of any required density into a reservoir usually placed underneath the foot-board of the engine. Each car was provided with a cylinder and piston underneath the body. The piston-rod was connected with the brake levers and the air reservoir communicated with the cylinders by pipes which were connected together by flexible hose between the cars. When it was desired to apply the brakes, the communication between the reservoir and the brake cylinders was opened by turning a cock so that the supply of compressed air stored up in the former could flow into the cylinders, and would then force out the pistons and thus apply the brakes. With this apparatus it was found, however, that some appreciable time was required to allow a sufficient quantity of air to flow through the pipes to fill the brake cylinders under each of the cars. The time consumed of course increased with the number of cars, because not only was the length of the pipes through which the compressed air had to flow increased, but the number of cylinders and of course the quantity of air were increased in like proportion.

There was also another difficulty encountered. In case of the breakage of a car coupling in a train, which occasionally happens, the locomotive runner would sometimes apply the brakes to the portion of the train connected to the engine and thus arrest its speed. As the connections of the air pipes were separated by the breaking of the coupling, it was of course impossible for him to control the speed of the cars which had broken loose by means of the atmospheric brake. Accidents sometimes resulted in this way by the rear cars running into the front part of the train.

For these reasons Mr. Westinghouse devised what he has called

THE AUTOMATIC AIR BRAKE,

which was also fully illustrated and described in the *Railroad Gazette* of August 2, 1873. To give an idea of the improvement of the "automatic" over the original "atmospheric" brake, we reprint the following extract from the description which was published at the time the "automatic" form was illustrated:

"These improvements consist, first, in attaching to each car a reservoir auxiliary to the main reservoir on the locomotive, which auxiliary reservoir is kept charged with compressed air, by means of an independent line of pipe, specially designed for that purpose, which leads from the main reservoir back through the train and communicates with each auxiliary reservoir. The communication from this pipe with each auxiliary reservoir is through a triple-valve device of peculiar construction, such that by the introduction of compressed air each auxiliary reservoir may be charged therewith, and by lowering the pressure in such pipe—either intentionally or by accident, as in case of disaster to the train—the triple valve will shift position so as to prevent the escape of air from the auxiliary reservoir, except through a pipe which leads therefrom directly to the brake cylinder and thereby applies the brakes. The brakes are released by again increasing the pressure in the brake-pipe referred to, by which means the triple valve is shifted so as to open the escape port from the brake cylinder, and also to provide for the recharging of the auxiliary reservoir. While by this means one mode is provided for applying and releasing the brakes, a double line of pipe extending from the main reservoir back under the train also enables the engineer to apply the brakes as in the old way, so that two independent ways are provided for applying the brakes, either of which may be used independently of the other when both are in order, and without the other when one is broken. Also, these devices are so arranged on the train that a car furnished with either set, as heretofore used, may be made up into a train with cars having the complete outfit above indicated. And the pipes of these two systems are so connected together with an interposed double check valve, that when either system is used all communication with the pipes of the other system is automatically closed."

From the preceding description and from the illustrations published in the *Railroad Gazette* of August 2, 1873, it will be seen that three lines of pipe were required in this first form of the automatic brake, two of them for operating the brake in the old manner direct from the engine, and the third for the automatic system. Since then Mr. Westinghouse has simplified its construction, and now uses but one line of pipe, as shown in the illustrations published herewith. He has also made other important improvements which are represented in the illustrations and which we will describe in their relation to other parts. We will add that a great part of the following description has been furnished to us by the inventor.

THE APPLIANCES ON THE ENGINE.

Figs. 1, 2, 3 and 4 represent the arrangement of these parts of the present form of the Westinghouse automatic brake which are attached to the locomotive and tender. Fig. 1 is a side view of the locomotive and tender—the locomotive, by the way, being one constructed by Mr. Cummings of the Pittsburgh, Fort Wayne & Chicago Railway. Fig. 2 is a view of the back end of the engine with the brake attachments, fig. 3 an inverted plan of a part of the engine and of the tender, and fig. 4 is an end view showing one of the brake beams on the tender and the position of the brake levers.

The compressing apparatus, consisting of a steam cylinder, A, and pump, B, fig. 1, is bolted to the boiler or frame. The steam used to operate the pump is taken directly from the boiler through the pipe a a, the quantity being regulated by the throttle valve a'. The exhaust steam is led by the pipe a' a' to the smoke-box and thence escapes up the chimney. The air enters the pump B by the pipe b, and is forced through

the pipe b' b' into the reservoir C, figs. 1, 2 and 3. The pipe c c leads to one opening of the three-way cock D (shown most clearly in fig. 2), which communicates by a second opening with the pipe d d beneath the foot-plate, and, by a flexible hose connection d', figs. 1 and 3, to the main brake pipe G G, fig. 3, under the tender-frame. A cock, L, is put in the pipe G near the back end of the tender, beyond which is attached the hose coupling G, which forms a connection with the adjoining car. A branch, e e, fig. 3, leads from the main brake pipe G to one opening of the triple valve F—the construction of which will be fully explained hereafter—and by a second pipe, r, connects to the reservoir R. A third opening of the triple valve is connected with the brake cylinder E by the branch pipe f, and the pipe f also communicates by a branch pipe, f f', with the driving-wheel brake cylinders, H, H, whose construction and operation will also be fully explained hereafter.

ATTACHMENTS ON THE CARS.

Figs. 5, 6, 7 and 8 show the application of the present form of automatic brake to an ordinary eight-wheeled car. Fig. 5 is a side view of such a car, fig. 6 an inverted plan, fig. 7 an end view, and fig. 8 a cross section representing an end view of the brake cylinder, reservoir and their attachments.

The brake cylinder A, figs. 5, 6 and 8, is bolted to a plank and securely fastened to the longitudinal timbers underneath the car. The piston of this cylinder has a cross-head, a, fig. 6, having an arm, b, to which the spring releasing lever c is connected. To this cross-head a is attached one end of the lever d, the opposite end of which is connected to the brake-rod e. On the end or head of the cylinder A opposite the cross-head a is a bracket, y, which acts as a fulcrum for one end of the lever f, the other end of which is also pivoted to another brake-rod, e; the levers d and f are connected by a tie-rod, g. These levers are so arranged that if the piston be thrust forward, carrying the cross-head a, the two rods e, e will approach each other and thus apply the brakes. The levers d and f are held in a horizontal position by the bracket h (a portion of which is represented as broken away in fig. 6) made of light wrought iron and attached to the frame of the car. The brake pipe B is arranged as near the centre of the car transversely as is convenient, with the stop cocks C C near each end of the car. The auxiliary reservoir R is also attached by iron straps to the bottom of the car, and into one end is screwed a pipe, connected to which is the triple valve D. As the action of the brake is to a very great extent dependent upon the working of

THE TRIPLE AND LEAKAGE VALVES,

in order to understand how the pressure of the air is controlled, it is necessary first to understand clearly the action of this ingenious and beautiful contrivance. Fig. 9 represents a section of the triple valve and fig. 10 a section of the leakage valve.

The triple valve has a case or body, with three connections for half-inch gas pipe, the connection from the main pipe being through the port E; a second pipe connection from the port F leads to the brake cylinder, while the remaining port, shown in dotted lines back of the valve 12, is connected to the auxiliary reservoir. This case contains the body of the four-way cock, 17, and valve chamber, B, and has also a piston chamber, A, fitted with a piston and stem, 4, which is kept central with the bore of the two chambers by the end of the stem sliding in the hollow cap, 5, screwed into the upper end of the case. A slide valve, 12, is fitted loosely between a shoulder and collar of the stem of the piston, and moves with it. In the chamber B under this slide valve are two ports or passages, b and d; the first, passing through the plug of the four-way cock, 17, connects with the port F, and thence to the brake cylinder. The port d communicates directly with the atmosphere, and with a cavity, c, formed in the valve 12 and the port b, constitutes a discharge passage for the release of the compressed air from the brake cylinder after the application of the brakes. The piston, 4, packed with a ring, 11, has a central port, g, leading into the opening, h, through its stem, which is the only passage for air between the chambers A and B. Into the lower end of the case is screwed the cap 6, with a rubber packing ring, 10, interposed between it and the chamber A. This cap has a chamber containing a stem, 7, with a collar, between which and the second cap, 9, is the spring, 8, pressing the stem and collar with considerable force against the upper end of the chamber containing them. This stem, 7, passes a short distance into the chamber A, where it is turned down at g so that the port g in the piston may slide over it and against the shoulder thus formed. A small needle, long enough to pass into the passage h, is fitted in the end of the stem which enters the port g, and serves to keep the passage free from dirt.

From the main brake pipe, the air enters by the port E, and then by the passage a through a suitable opening in the plug of the four-way cock, 17, passes on through holes drilled in the cap 6 into the bottom of the chamber A, where, acting on the piston 4, it forces it with the slide valve 12 into the position shown, opening the port g at g', whereby the chamber B and auxiliary reservoir connected therewith are charged to the same pressure, this pressure being maintained throughout the train in all of the reservoirs and main brake pipe. To fully apply the brakes, air is discharged from the main pipe, and consequently from the chamber A, when, by excess of pressure in the chamber B, the piston 4 is forced down, closing the port g, and forcing the stem 7 with its spring so as to permit the piston to seat itself on the rubber packing ring 10 at the same time the valve 12 is moved, so as to uncover the port b, establishing communication from the chamber B, and consequently with the auxiliary reservoir to the brake cylinder. To release the brake, air is again admitted to the main pipe and chamber A, causing by excess of pressure the piston 4 with valve 12 to assume the position shown in the drawing, whereby the ports b and d are brought in communication through the cavity c, at the same time the port g is opened for recharging the reservoir. To apply the brake lightly, a slight reduction of pressure

is made in the brake pipe and chamber A, which causes the piston to move so as to uncover the port b, applying the brakes and reducing the pressure in the chamber B. As soon as the pressure is reduced so it about equals that in the chamber A, the spring 8, acting against the collar of the stem 7 and piston 4, moves the valve far enough to close the port b without releasing the brakes. The force admitted to the brake cylinder will depend altogether upon the reduction of pressure in the main pipe and chamber A, such reduction being entirely under control.

To prevent the application of the brakes after the engine is disconnected from the train by such reduction of pressure in the brake pipes as may result from leakage, a small valve, the construction of which is clearly shown in fig. 10, is inserted in the pipe between the port F and the brake cylinder. This valve consists of a case, 15, with a cap, 13, having a rubber face, 16, and within the chamber of this case a valve, 14, which is acted upon by air pressure entering the lower port. When the air enters this port slowly, as resulting from a leakage in the brake pipe, or other slight reduction of pressure, the valve 14 remains in its position, such air passing around and to the atmosphere, without setting the brakes. When the brakes are being operated the valve is seated upward against the rubber face 16, preventing any escape of air. A drip cup, H, fig. 8, is screwed on the cap 9 of the triple valve, and is provided with a cock. The plug 17 of the four-way cock, by a quarter turn, brings the ports E and F in connection, whereby the air passes directly from the brake pipe to the brake cylinder for the direct application of the brake, without charging any of the other parts. Both triple and leakage valves are arranged perpendicularly in the pipes, as shown in the drawings.

The arrangement of the pipes connected with the triple valve is shown in Fig. 8. From the brake pipe B a branch pipe, E, connects with one of the openings of the four-way cock, and from a second opening of this four-way cock or pipe, F, leads to the brake cylinder A, in which pipe is arranged the leakage valve G. The pipe B is held in its position by small clips, and must be absolutely air-tight.

OPERATION OF THE BRAKES.

In the operation of the brakes, the couplings between the cars are connected in the usual manner, and the handles of all the cocks C, C, fig. 6, in the main brake pipes are turned down so as to open them, excepting the one at the rear end of the train, which is turned so as to close the end of the pipe. When it is necessary to detach any portion of the train, the cocks C must first be closed to prevent the escape of air and the application of the brakes.

Each reservoir, R, is provided with a small cock which may be opened to release the brakes if they should be applied accidentally when the pipe is disconnected from the main reservoir. A branch, I, fig. 6, leads from the pipe B to a valve located in the water closet in the car, and the handle of this valve has a cord attachment which passes through the interior of the car. If this valve be opened by an employe or passenger in the train, the air will escape from the brake pipe B, and the brakes thus be applied to the whole train. The escape from this valve is led by a pipe K through the bottom of the car.

In the arrangement of the pipe B provision must be made for coupling the hose diagonally under the draw bar. This is done by arranging the end of the pipe to come under the hand brake-wheel.

CLUTCH COUPLING.

Figs. 15, 18, 19 and 21 show the construction of the improved clutch coupling for connecting the flexible rubber hose between the cars. Fig. 15 is a longitudinal section of the two parts when they are coupled together; fig. 18 an external view of them, and fig. 19 one piece without the other. They are coupled together by the two pairs of lugs or projections A B, A B, interlocking with each other, and they are attached or locked together simply by placing the two parts together and giving them a twist so as to cause the projection to engage with or into each other.

The joints are formed by rubber rings, 8, 8, which are made tight by the internal pressure, while these same rings form seats for the valves, 5, 5, when the couplings are separated. It will also be noticed that the internal pressure has a tendency to hold this form of coupling together more firmly. They are provided with valves when used with the air brake, but when used for the automatic brake alone the valves are removed, and pieces represented by fig. 17 are inserted to expand the rubber rings, or rather to prevent them from collapsing. Both halves of this coupling being exactly alike, and there being no tendency whatever for the air pressure to blow them apart, a single line of pipe and couplings of this kind between the cars answers the purpose of the double couplings heretofore used. Fig. 21 represents the coupling on a smaller scale and attached to the hose 11.

AIR PUMP.

Figs. 13 and 14 represent the form of air pump or engine now employed for compressing air for operating the brake. Fig. 13 is a section and fig. 14 a front view. A differential piston-valve movement is used, in which the difference in area between the two ends is such that when steam is admitted between them the tendency of the valve is to move upward, which gives a downward stroke to the main piston. When the main piston reaches the bottom of its stroke, it operates upon the reversing valve rod, causing the valve 13 to uncover a port by which steam is admitted above the piston 20 in the cylinder 19, which by excess of pressure causes the main valve to descend, exhausting from the upper part of the steam cylinder and admitting steam below the main piston. As the main piston completes its upward stroke the valve 13 is again moved so as to exhaust the steam from the reversing cylinder, whereby the reversing piston is moved upward together with the main valve by the difference of pressure between the two valve pistons. These valves are easily removed and examined, proper wrenches being sent with each set of apparatus for

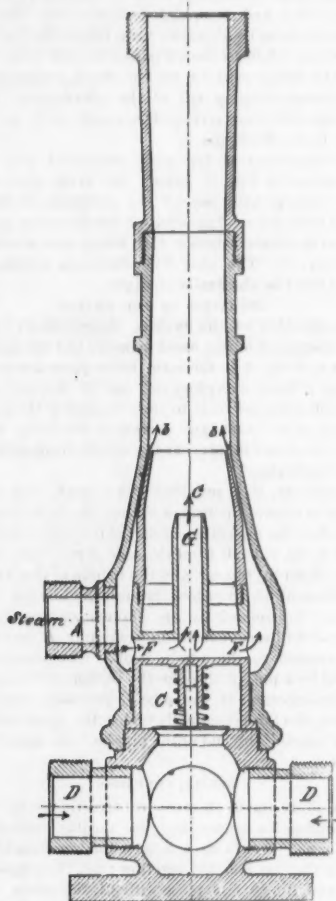
removing the caps 29 and 30, and the valve seat 31, in which the upper discharge valve works.

DRIVING-WHEEL BRAKES.

Figs. 11 and 12 represent the application of an atmospheric brake to the driving-wheels of a locomotive. The same arrangement is also shown in figs. 1 and 3.

The retarding force of brakes on the driving-wheels and tender of an engine is said to be double that of the engine reversed with the tender brakes set by hand, and it is also stated that an ordinary freight train can be stopped in less time and distance with the engine and tender when equipped with this apparatus than by the usual number of brakemen when at their posts, and that an ordinary passenger train can be stopped in nearly one-third less distance when the engine is fitted with these brakes in addition to the others than when without the driver brakes.

The brake is applied to the driving-wheels by means of a cylinder, *H*, figs. 1, 11 and 12. The piston-rod *K* of this cylinder is connected by the cross-head *G* and two links with the cams 15, 15, which are attached to the brake-blocks *L L*. When compressed air is admitted underneath the piston in the cylinder *H*, it is obvious that its action on the cams 15, 15, will force the brake-blocks against the wheels.



A check valve is used to prevent a too sudden application of the brakes by causing the air from the three-way cock to seat the valve, through which is drilled a small hole for feeding the brake cylinders properly. When the brakes are released, this valve unseats and permits a quick escape of the air. This valve is inserted in the pipe before it is branched to lead to the driving-brake cylinders. A safety valve is also attached to the pipe between the check valve and the brake cylinders, the opening from this safety valve being large enough to blow off the pressure at the desired point as fast as the air passes through the small hole in the check valve.

Mr. Westinghouse has also devised a signalling apparatus, by which a small whistle is made to sound in the cab by means of compressed air conveyed through the brake pipes. This we have not illustrated, but hope to do so at some future time.

ROADS ON WHICH THE AUTOMATIC BRAKE IS NOW USED.

The automatic brake is now in use on the following railroads: the Pennsylvania, the Philadelphia & Reading, the Lehigh Valley, the Chicago & Alton, the St. Louis, Kansas City & Northern, the Toledo, Wabash & Western, the Illinois Midland, the St. Louis, Iron Mountain & Southern, the South Carolina, the St. Paul & Sioux City, the Sioux City & St. Paul, the New Orleans and Mobile, the Mobile & Montgomery, the Delaware & Hudson Canal Company's lines, the New London & Northern, the Chicago, Burlington & Quincy, the Boston & Providence, and the New York Central & Hudson River Railroad.

RELATIVE ADVANTAGES OF THE ATMOSPHERIC AND VACUUM SYSTEMS OF BRAKES.

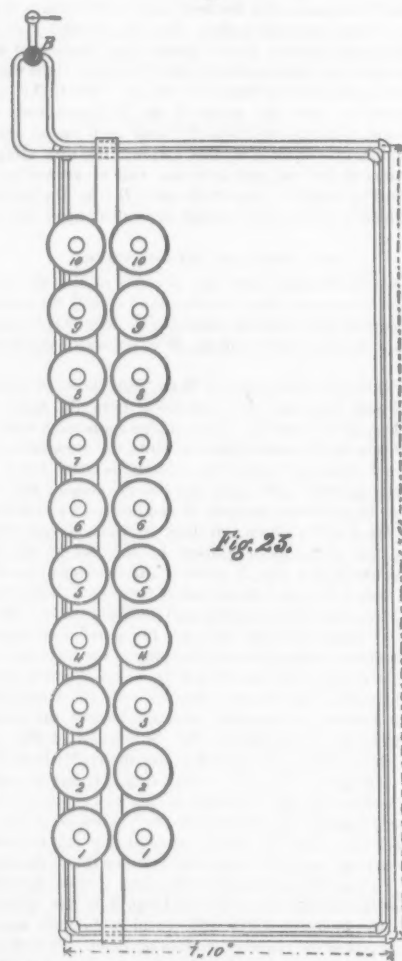
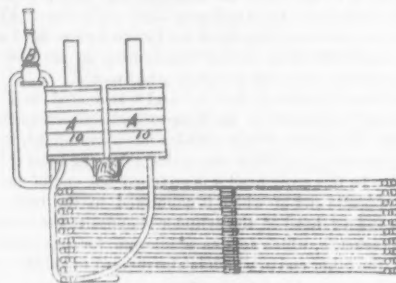
During the past few years there has been a great deal of discussion regarding the relative merits of the atmospheric and the vacuum system of brakes. The latter, it has been claimed, is much simpler in construction, consequently less liable to get out of order, and therefore cheaper to maintain than the other system. On the other hand, the advocates of the atmospheric system claim that with it any desired pressure of air can be obtained, and that therefore it will act much more promptly than it is possible to cause the ordinary pressure of the atmosphere to act

against a vacuum. Besides, with the atmospheric system the air is compressed and stored up in suitable reservoirs ready for use, whereas with the other system the vacuum must be produced after the brakes are to be applied. This consumes an appreciable amount of time, which in cases of danger is often of vital importance. In order to determine the difference in the action of the two systems, the Westinghouse Air Brake Company, which now controls the patents for the vacuum brake, has constructed a complete set of each system of

APPARATUS FOR EXPERIMENTAL PURPOSES, which are intended for exhibition at the Centennial. Figs. 22, 23 and 24 represent the vacuum system and 25 and 26 the automatic air brake. As some of our readers may not be familiar with the operation of the vacuum brake, perhaps a word of explanation may be needed.

THE VACUUM SYSTEM OF BRAKES.

In this system the vacuum is produced by an "ejector,"



which is represented by fig. 21. Steam is admitted into this through the pipe *A* and escapes through the annular opening *b b* and the central jet *F F G*, which creates an induced current up the pipe *C C*. This communicates with the two pipes *D, D*, which are connected with the brake pipes. Under each car are two india-rubber collapsible cylinders similar to the bellows of an accordion. These cylinders are represented at *A, A*, fig. 22, and also on a larger scale in fig. 10. When a vacuum is produced inside of these cylinders, the atmospheric pressure is exerted on the outside to compress them. Iron rings are inserted in the inside so as to prevent the cylinders from collapsing sideways, so that the atmospheric pressure is exerted on the heads. One of the heads is bolted fast to the car, and the other is attached to the brake levers, so that whatever pressure is exerted on the movable head is communicated to the brake levers, thus applying the brakes. Fig. 22 represents an end view of the

EXPERIMENTAL APPARATUS FOR THE VACUUM BRAKE, fig. 23 a plan. *B* is the ejector, which is connected to two lines of 1½ in. gas pipe, which are laid in a rectangular coil as shown in the plan, fig. 23. Two rows of rubber cylinders are arranged above these pipes and are numbered from 1 to 10 inclusive. The ejector and the first pair of cylinders are connected with the uppermost lines of pipes in the coil, and therefore the air exhausted from these cylinders must pass through the coil but once, which represents the conditions which exist in the tender. The second pair of cylinders is connected with second coil of pipes, and therefore the air which is exhausted from them must pass

twice through the coil. The third, fourth, fifth, etc., cylinders are connected with the corresponding coils, and the air exhausted from them must consequently pass through the coil three, four, five, etc. times down to the tenth cylinder, which is connected with the bottom pipes, and therefore the air from it must pass ten times through the coil. It should also be stated that each of the rubber cylinders has two coiled springs inside to represent the resistance of the brakes. Fig. 27 represents a section of one of these cylinders and shows the coiled springs. The smaller one of these required 760 lbs., and the larger one 1,120 lbs. pressure to compress it.

EXPERIMENTS WITH THE VACUUM APPARATUS.

The writer had an opportunity of making a series of experiments with this apparatus, and also with that representing the automatic air brake—which will be described hereafter—a short time ago, which showed very clearly the difference in the time required to apply the brakes with the two systems. The first experiment was made to show the time required with the vacuum system to "take up the slack" of the brakes. In practice it is found that a movement of about six inches of the cylinder-head is required to take up the lost motion, wear of brake blocks, or the distance which they stand off from the wheels, or, in other words, "take up the slack." The time required to do this was carefully taken with a stop-watch from the moment steam was admitted to the ejector until each of the cylinder-heads was compressed the distance required. The results are given in the first experiment recorded in the following table:

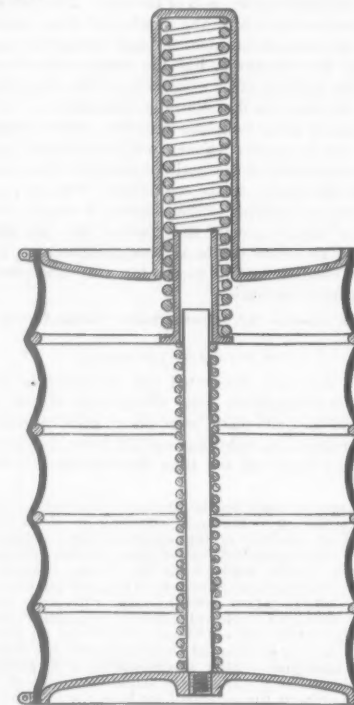


Fig. 27.

EXPERIMENTS WITH VACUUM BRAKE APPARATUS.

No. of experiment	Numbers of cylinders.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1...	Seconds required after the application of the ejector to collapse the cylinders 6 inches... or put brakes "full on".....										
2...	Seconds to collapse the cylinders 10½ inches or put brakes "full on".....	2	3¼	4¾	6¾	7¾	8¾	9	9	9¾	9
3...	Seconds to collapse the cylinders 6 inches with six pairs of cylinders....	9	14	17¾	16¾	15¾	15¾	16¾	17	16¾	16¾
4...	Seconds to collapse the cylinders 10½ inches with six pairs of cylinders....	2	2¾	4¾	4¾	4¾	4¾	.....	.....	.....	.....
5...	Seconds to collapse one-half the cylinders 6 inches with a single line of pipe.....	6¾	7¾	9	8¾	8¾	8	.....	.....	.....	.....
6...	Seconds to collapse one-half the cylinders 10½ inches with a single line of pipe.....	¾	2¼	3¾	4¾	6¾	7	8¾	8¾	9	9
		6	10¾	11	12	15¾	15	14¾	15	16¾	15¾

EXPERIMENTS WITH AUTOMATIC AIR-BRAKE APPARATUS.

7...	Seconds required to take up slack, or move piston 4¼ in....	¾	.....	.....	.....	1	.....	.....	.....	1¾	.....
8...	Seconds required to reduce pressure in reservoirs 2½ lbs....	¾	.....	.....	.....	1¾	.....	.....	.....	1¾	.....
9...	Seconds required to reduce pressure in reservoirs 12 lbs., or put brakes "full on".....	¾	.....	.....	.....	2¾	.....	.....	.....	2¾	.....

The heads of the cylinders each had a maximum motion of 11½ in. The time required to move them 10½ inches, or to put the brakes "full on," is given in the record of the second experiment.

In order to show the action of the ejector with a shorter train, four pairs of the cylinders were disconnected, leaving six, which are equivalent to a train of five cars and a tender. The time required to move this number of cylinders so as to "take up the slack" of the brakes is given in the third experiment, and the time consumed in putting them full on in the fourth. An experiment was also made to determine the pressure required to collapse an empty rubber cylinder. It was found that a vacuum of a half inch was needed to move it six inches, and that 6 inches, or a pressure of three pounds per square inch, was required to collapse it completely.

Time of application of Ejector.	Vacuum Produced.	Equivalent Pressure.
2 seconds.	2 inches.	1.00 lbs.
4 "	3 "	1.87 "
6 "	4 "	2.50 "
8 "	5 "	3.25 "
10 "	6 "	4.37 "
12 "	7 "	5.00 "
14 "	8 "	5.87 "
16 "	9 "	6.87 "
18 "	10 "	7.62 "
20 "	11 "	8.62 "
22 "	12 "	9.75 "

One line of the pipes and one-half of the cylinders were then disconnected, and an experiment made to determine the action of the ejector on half the number of cylinders and a single line of pipes. The time required to "take up the slack" is recorded in the fifth experiment, and the time to put the brakes full on in the sixth.

All of the cylinders were then connected by a single line of

c' with the triple valve T'. The brake cylinders are also connected with the triple valves by pipes d', d'', d''', etc., which are equivalent to those used under cars. The cocks f', f'', f''' etc., are the same as those attached to the main brake pipes. The apparatus was in fact the equivalent in all respects of that employed on a train of a tender and nine cars, and was arranged in the compact form shown for convenience in experimenting. The auxiliary car reservoirs A', A'', etc., were 12 in. diameter by 30 in. long, and the brake cylinders were 10 in. diameter by 12 in. stroke.

EXPERIMENTS WITH THE AUTOMATIC AIR APPARATUS.

The first experiment with this apparatus was made to determine the time required to take up the slack of the brakes. The results are given in the first table in experiment numbered 7, from which it will be seen that it took only $\frac{1}{4}$ of a second to take up the slack in the first cylinder, instead of two seconds with the vacuum apparatus; and on the sixth cylinder it required one second with the one and $\frac{1}{2}$ seconds with the other, and on the tenth cylinder $1\frac{1}{2}$ seconds with the automatic and 9 with the vacuum apparatus. The time required to take up the slack was also determined in another way (experiment 8). Each auxiliary reservoir was provided with a steam gauge. The pressure in these reservoirs was 75 lbs. per square inch. The cubical contents of each of the reservoirs was 3,390 cubic inches, or two cubic feet very nearly. Now, if the pressure of this quantity of air is reduced from 75 to 72 $\frac{1}{2}$ lbs., the volume must have increased in inverse proportion, or from 3,390 cubic inches to 3,607, so that a quantity of air equivalent to the difference in these volumes, or 117 cubic inches of air of a pressure of 72 $\frac{1}{2}$ lbs., must have flowed from the reservoir into the brake cylinder. The area of the piston in the brake cylinder

8.25 seconds with the vacuum apparatus and 1.91 seconds with the automatic air brakes. Now if, as seems probable, the speed of a train is diminished uniformly after the application of the brakes, then if the average time required to bring the brake blocks to bear against the wheels is represented by x seconds, and the average time to fully set the brakes is y seconds, and a is the distance the train is moving per second at the time of the application of the brakes,

then the formula $\left\{ \frac{y-x}{2} \right\} \times a =$ the saving in distance if

the brakes had been applied instantly. Applying the data deduced by the experiments to the above formula, we find that at a speed of 30 miles per hour a train would run 332.2 feet in the time which is lost in applying the vacuum brake. At speeds of 40, 50 and 60 miles per hour the distance lost is 442.8, 553.6 and 664.4 feet, respectively. With the automatic brake these distances are 62.9, 83.8, 104.8 and 125.8 feet at the same speeds. The difference then would be, that with the automatic air brake a train can be stopped in 269.1 feet shorter distance at a speed of 30 miles per hour, and at speeds of 40, 50 and 60 miles per hour the distance saved is 359, 448.8, and 538.6 feet, respectively. These results compare very closely with those of the experiments made on the Toledo, Wabash & Western, and the Chicago & Alton roads in July, 1874, a record of which was published in the *Railroad Gazette* of September 19, 1874. In these experiments with the vacuum brake it took three seconds to take up the slack in the front car, $9\frac{1}{2}$ seconds on the middle, and 19 $\frac{1}{2}$ on the last car. With the air brake it took less than $\frac{1}{4}$ of a second on each of the cars. To put the full pressure of the brakes on with

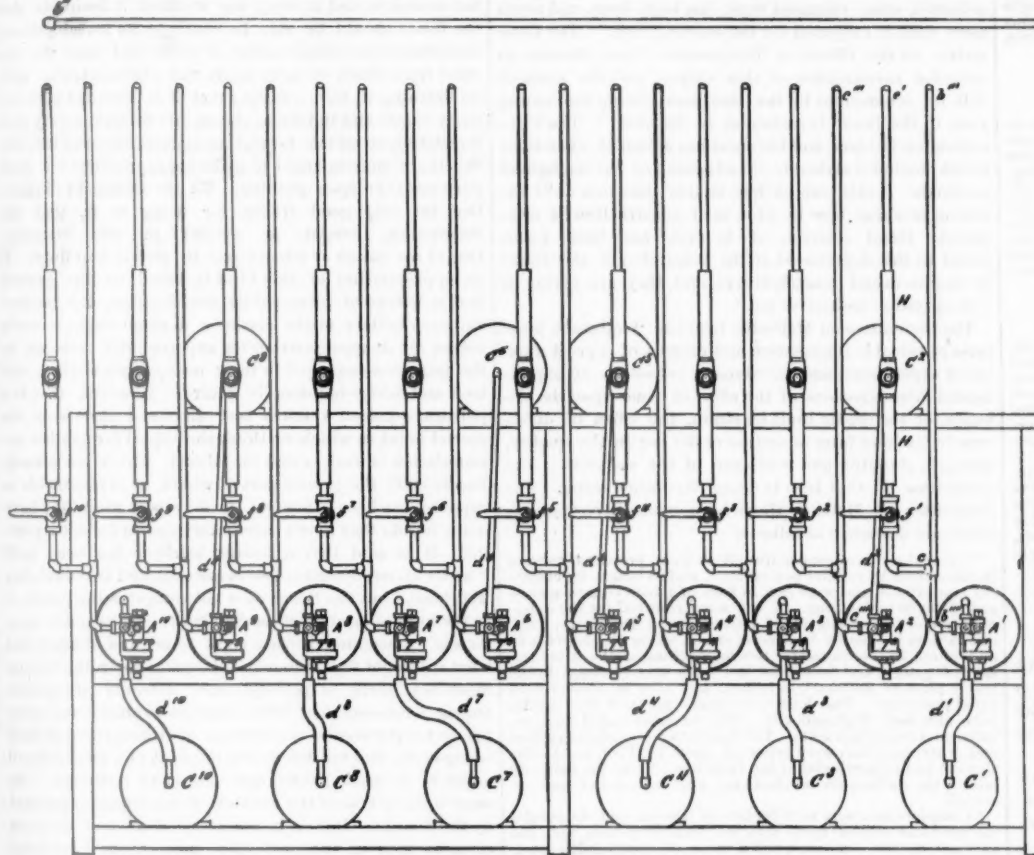


Fig. 25.

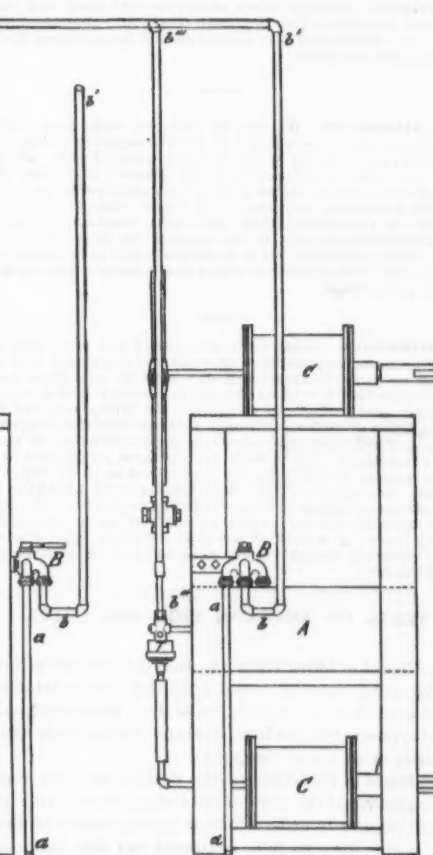


Fig. 26.

pipe, and it was found that it took 42 $\frac{1}{2}$ seconds to put the last one "full on." It should be stated that the steam pressure in the boiler from which the supply was drawn to operate the ejector was 110 lbs. in all the experiments excepting the last, in which it had fallen to 105.

Another experiment was also made to determine the amount of vacuum produced by the ejector in a given time. With a steam pressure of 110 lbs. in the boiler, the results shown above were obtained.

A vacuum of 23 in. was produced by the ejector in 29 $\frac{1}{2}$ seconds, and 23 $\frac{1}{4}$ inches was the greatest vacuum which could be produced.

THE AUTOMATIC AIR BRAKE EXPERIMENTAL APPARATUS.

The apparatus representing the automatic air brake is shown in figs. 25 and 26, fig. 25 being a front and fig. 26 an end view. The pump for compressing the air is not shown in the engravings, but was the same as that already illustrated. A', A'', A''', etc., are air reservoirs, the same as those used under the cars; C', C'', C''', etc., are the brake cylinders; B is a three-way cock; and T, T', T'', etc., the triple valves. The pipe a is connected with an air reservoir the same as is used on locomotives. From the three-way cock B a pipe was carried from b vertically to b', then horizontally to b'', and back again to b', and then down to b''', where it connected with the triple valve T', the whole length and the size of the pipe being equal to that used on a car. From this pipe at c another similar pipe was connected with a flexible hose and coupling, H H, the same as is used between cars. This pipe was carried vertically and horizontally the same distance as the pipe b. In fig. 25 these pipes are, for convenience and to save room in the engravings, represented as broken off at the top. The pipe c, however, extends from c upward to c'', then horizontally, the same as pipe b, shown in fig. 26, to c''', and then downward, and connects at

being 78.5 square inches, a motion of $\frac{1}{4}$ in. would require 353 cubic inches of air to fill the space behind it, so that the 117 cubic inches would be expanded about three times to fill this space. This would have a pressure on the piston of about 24 lbs. per square inch, which is more than sufficient to take the slack. In this calculation no account is taken of the air required to fill the connecting pipes and clearance spaces, but these are very small, and as strict accuracy is not important here, they may be disregarded.

The next experiment, No. 9, was made to determine the time required to put the brakes fully on. This was done by noting the time required for a sufficient amount of air to flow from the reservoirs into the brake cylinders, so as to reduce the pressure in the reservoirs 12 lbs., the original pressure being 75 lbs. Such a reduction implied that the volume of air in the reservoirs had been expanded in inverse proportion to the pressures, or from 3,390 to 4,035 cubic inches, so that 645 cubic inches of air, at a pressure of 63 lbs. must have flowed from the reservoir into the brake cylinder. It has been explained heretofore that the brake levers are so proportioned that a pressure in the cylinders of 50 lbs. per square inch produces a pressure on the brake shoes equal to the weight on the wheels. If this air is expanded to that pressure, its volume will be 813 cubic inches, which would move the piston 10 inches, and put the brakes "full on."

COMPARISON OF THE ACTION OF THE TWO SYSTEMS.

By comparing these experiments, it will be seen that the average time required to "take up the slack" with the vacuum apparatus was 6.85 seconds. With the automatic air brake it was 0.95 of a second, or a difference of 5.9 seconds. In that time a train running at a speed of 30 miles per hour would run 259.6 feet, at 40 miles 346.1 feet, at 50 miles 432.6 feet, and at 60 miles per hour 519.2 feet.

The average time required to put the brakes "full on" was

the vacuum brake 12, 23 $\frac{1}{4}$ and 19 $\frac{1}{2}$ seconds were required on the front, middle and rear cars, respectively, and with the air brake 1 $\frac{1}{4}$, 2 $\frac{1}{2}$ and 2 $\frac{1}{2}$ seconds. At a speed of 35 to 40 miles per hour, the train with the air brake was stopped in a distance 383 feet less than that with the vacuum brake.

THE SCRAP HEAP.

British Iron Trade.

Ryland's *Iron Trade Circular* of March 18 says: "The iron trade generally goes from bad to worse. In every district works are closing and furnaces are being blown out. The demand is literally reduced to so low a point that makers prefer to close altogether than to go on at a loss. It is only at those works which produce a special article that anything like briskness is to be found. But for the products of the vast rail establishments of the North of England and South Wales we see but little chance of anything like a revival; for it would almost appear that the demand for iron rails is at an end. The Bessemer steel article is so much more durable, and can be had at from £8 to £9 a ton, while iron rails are quoted at £5 5s. to £6 10s. at works. This is not a pleasant prospect for the ironmasters in the North of England with their new works and costly plant. In fact, from no foreign market do we expect any lively demand for railway iron, as so many of the Continental Governments are just now enduring considerable internal as well as external trouble. And as to finance, they are nearly all what may be termed "hard up." Then our hitherto largest customers, the United States, will never want so much of our iron as they have done. They are making it themselves."

Medals for American Car Wheels.

The Commissioners of the late Chilean International Exposition have awarded a first-class medal to the Ramapo Wheel and Foundry Company, of Ramapo, N. Y., for chilled cast-iron car wheels. These car wheels were exhibited in competition with wheels from English, Austrian, Belgian and several American manufacturers.



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CONDUCTED BY

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Editorial Announcements.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

TESTS OF AMERICAN IRON AND STEEL.

The Board of Direction of the American Society of Civil Engineers has recently issued a circular calling attention to the work done and laid out to be done in future by the Board appointed to test iron, steel and other metals under authority of an Act of Congress.

The Board of Direction of the Society of Civil Engineers approves of the work of the testing board, and petitions Congress to make a further appropriation of \$50,000 to enable the tests to be continued and the investigations to be carried still further.

The field of research which this testing board has mapped out for itself is the most extended that has ever been undertaken in any similar investigations, and must, if faithfully and intelligently carried out, as there is every reason to believe it will be if the necessary expenses are provided for, be of inestimable value to engineers, manufacturers and to the public generally.

It is announced that "not only are materials to be tested and the results stated as those derived from the examination of a metal of a conventional denomination, but the test-piece, in each case, will usually be examined to determine how far peculiar qualities are attributable to peculiarities of chemical composition and of physical structure."

The investigations will consist first of a collection of all accessible information and the results of experiments and investigations which have thus far been made by others. This information is sought by issuing circulars of inquiry, by examining the published literature relating to these subjects and the records of experiments made by other parties in similar investigations. The chemical analyses will be made in a laboratory especially established by the board for this purpose at the Watertown Arsenal, and by a chemist employed by the Board, who we are told has already done a large amount of work upon irons and steels. The circular of the Society of Civil Engineers states that "a series of steels is in preparation under the direction of the Committee on Chemical Research in which, other elements being retained constant in amount, the carbon varies regularly from 0 to 2 per cent.; another series, with carbon uniform, has silicon in varying proportions; another set varies in phosphorus, still another in sulphur, and another series is variable in manganese." The mag-

nitude of such an investigation if thoroughly made is almost appalling, if it is remembered how very slight a quantity of some of these elements will affect the quality of the material, and that to make the investigation thorough it will be necessary to experiment on each combination of different proportions of these ingredients. This investigation, it is said, "greatly as it has been needed, has never before been even attempted."

The Board has divided itself up into committees which have taken up special lines of research. The Committee on Abrasion and Wear is experimenting at the Stevens Institute on abrasion and wear of the metals and the effects of lubrication in reducing it. The Committee on Armor Plate is collating information from domestic and foreign sources, chiefly from the records of the Army and Navy departments of this country and of the British Admiralty. The Committee on Chemical Research has charge of the chemical investigations referred to. The Committee on Chains and Wire Rope is "working up the data which have long been collecting at the Navy Department," and further experiment will, if necessary, be made there to supply any additional information which may be needed. It is said that already these investigations have revealed serious defects in the accepted tables of sizes and strength. The Committee on the Corrosion of Metals is investigating the conditions affecting the corrosion of metals in use. It is somewhat indefinitely said that "some information has been collected, some chemical work has been done, and much more work is projected for the ensuing year." The Committee on the Effects of Temperature "has planned an extended investigation of this subject, and the research will be commenced by the chairman during the coming year, if the Board is sustained in its work." The Committee on Girders and Columns has a plan of operations which includes elaborate investigation of the strength of materials. Little can be done in this direction until the testing machine now in process of construction is completed. Great interest, it is said, has been manifested in this department of the researches of the Board by engineers and manufacturers, and, they are giving it "co-operation and active aid."

The Committee on Malleable Iron has "collected a large mass of valuable information and records of a great number of experiments and an extensive collection of experimental determinations of the effect of time upon the elevation of the elastic limit by strain, the effect of difference in size and form of section of the bar on the quality, strength, ductility and resilience of the material. The Committee on Cast Iron is doing the same thing. The Committee on Metallic Alloys have made investigations which are described as follows:

"Several series of copper-tin alloys were prepared, varying in some cases by regular percentages, and in others by chemical equivalents, and were cast in bars of 1 inch square section and about 20 inches long. A set were reserved for the determination of the coefficient of expansion by Dr. Mayer. The others were broken by transverse stress, one set by dead loads, and others in the transverse testing machine of the Mechanical Laboratory, and deflections and tests were recorded to the fourth place of decimals, in inches, and also in meters with equal precision. The logs were made up, and the results were also laid off graphically. The curves revealed some peculiar and important facts. The fractures were photographed and, where peculiar, were reported upon by Prof. Leeds, the chemist and mineralogist of the Institute. From the data obtained, the coefficients of elasticity were calculated and recorded.

"Complete sets were next broken by tension, and the results recorded and worked up as with the transverse tests, and the logs and curves compared, and a series of compression specimens were made up as companion test-pieces.

"The full series was finally tested in the autographic recording machine, and from the strain diagrams, their strength, elasticity, ductility, resilience and homogeneity were deduced, and the law of variation worked up graphically. The effect of strain in elevating the elastic limit was observed.

"All specimens were examined by the chemist, and a comparison made between the proportions by mixture and composition in the bar which exhibit the loss of metal, and to some extent, change of physical character, produced by melting and casting.

"A determination of specific gravities of the metals as purchased, as cast and as compressed mechanically and in mass and in a state of fine division, concludes this research.

"A similar research is in progress, under the direction of this committee, by Prof. Thurston, its Chairman, which is intended, also, to be as complete and accurate as the resources at command will permit.

"Before entering upon this work, the Chairman collated all published material bearing on the subject, and a preliminary report of about 100 pages embodies the most important facts previously determined, and contains the bibliography of this subject of copper-tin alloys. This work was supplemented by making graphical records of the experimental work of Mallet, Mathiessen, Calvert, Johnson and others on the conductivity for heat and electricity, the specific gravity and other properties of copper-tin alloys, as had been examined by them. It was the intention to profit by facts already acquired by acknowledged authorities, to complement them by the new investigations, and to avoid useless repetition of work involving serious expenditure of time."

The Committee on Orthogonal Strains, that is, strains acting simultaneously at right angles to each other, as in the case of a rod subjected to torsional or shearing strains simultaneously with tensile or compressive strains, "is planning a series of experiments." The Committee on Physical Phenomena "is preparing to seek for the phenomena induced by stress." The Committee on Steel produced by Modern Processes is working with the Committee on Chemical Research. The Committee on Re-heating and Re-rolling is to test iron, etc., in the several stages of manufacture. The Committee on Steel for

Tools is making an extended series of experiments at the Washington Navy Yard.

The testing machine ordered by the Board is said to be well under way, and the building to receive it, the foundation and the accessory machinery are all in hands. The machine was designed by Mr. Albert H. Emery, and has an attachment, designed by Mr. Charles E. Emery, for obtaining an autographic strain diagram. Its capacity is 800,000 pounds in both tension and compression.

It is further stated in the circular referred to that "the Board is not prepared to make a report, as all the work is in progress and none yet completed." With the above general statement, which we have condensed as much as possible, the Board asks for a further appropriation of \$50,000 from Congress to carry on their investigations during the year 1876-77. The Board of Managers of the Society of Civil Engineers also petitions Congress to make such an appropriation. Now, as we have already said, the investigations of this Board promise to be of the utmost value to all interested in the subjects to which they relate, and also, as stated by the managers of the Society of Civil Engineers, will be of great value to the Government directly in the construction of vessels, engines, boilers, cannon, armor-plates, light-houses, etc. The amount of money asked for could not, we think, be more wisely expended in any other way; the amount, considering the ends to be attained, is not excessive, and in every way we think it desirable that the Board should be able to continue its investigations; nevertheless we believe many of those who read the circular from which we have made the above extracts will, on finishing it, have a feeling that it is pervaded with too many vague and indefinite statements to form a very firm foundation on which to rest an appropriation of \$50,000. Whether Congress ought to make appropriations for such purposes is an open question. We are inclined to believe that the only good reason for doing so is, that the information sought is needed in the construction of the means of defence and in public buildings. If an appropriation of this kind is based on the ground that it will be of great public benefit, then the brewers and soap-boilers might make a demand with as much reason for an appropriation for experimental research in the processes employed in their occupations as the architects and bridge-builders in theirs. However, that is a political question which is best discussed elsewhere: the special point in which we think the appeal for another appropriation is weak is that the Board, which has already had \$75,000, the greater part of which, it is reasonable to suppose, has been expended, do not report what they have done, nor do they give a satisfactory reason for not reporting. It is said that a testing machine has been built "under extraordinarily close inspection, and is remarkably well built," but the Board does not enlighten the public as to the kind of machine it has had built. If the public pays for such a machine, it has a right to ask and to know just what it has got for its money. Besides, regarding testing machines, there is perhaps more diversity of opinion among engineers than with reference to almost any other piece of experimental apparatus or instrument used in their occupation; and for this reason the work of a public Board ought to be made public and subject to criticism. The same thing is true of the methods of investigation pursued by the Board. While it is composed of some of the most eminent men in the profession, men whose knowledge and skill may be relied upon implicitly, nevertheless when it is undertaken to place an important branch of engineering on a scientific basis, or so to speak to formulate long disputed points, the freest criticism and the fullest discussion are desirable. When it is announced that the chemist to the Board has already done a large amount of work, most persons want to know what that work is. If experiments have been made in lubrication, give us the results of those experiments as far as they have gone. If the Committee on Chains and Wire Rope has discovered "serious defects in accepted tables," let us know what they are. If after the breaking of test pieces of alloys it is announced that "some peculiar and important facts were revealed," the public are stimulated to an uncomfortable degree of curiosity to know what these facts are. It is not clear either why \$50,000 is needed to aid sub-committees to "plan a series of experiments," or to "prepare to seek for phenomena," or in "projecting work."

It would be, we think, a very great misfortune if the Board could not carry out the comprehensive experiments which it has begun and laid out for itself, but the public has a right to demand a report of progress at reasonable periods. If the Society of Civil Engineers petitions for a grant of public money, it must abandon its medieval policy of making the information it gains as little public as possible.

The First Quarter's Traffic.

Railroad earnings, reported so far, have been generally much larger than last year, and a good deal of encouragement has been caused thereby. We have called attention to the fact that the increase in earnings was not so much

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WESTINGHOUSE AUTOMATIC TRAIN BRAKE.

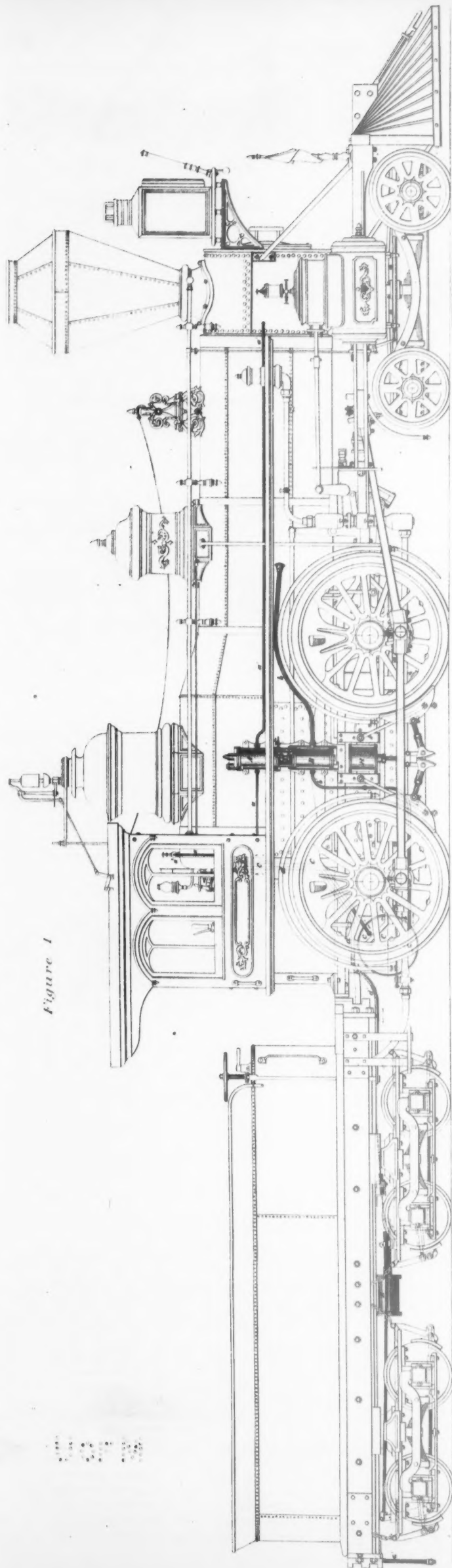


Figure 1

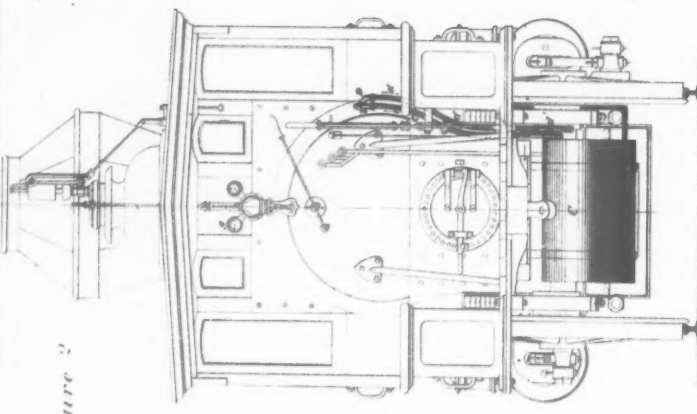


Figure 2

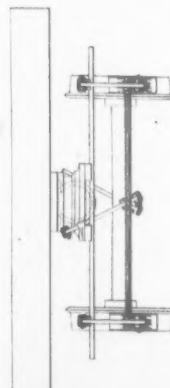


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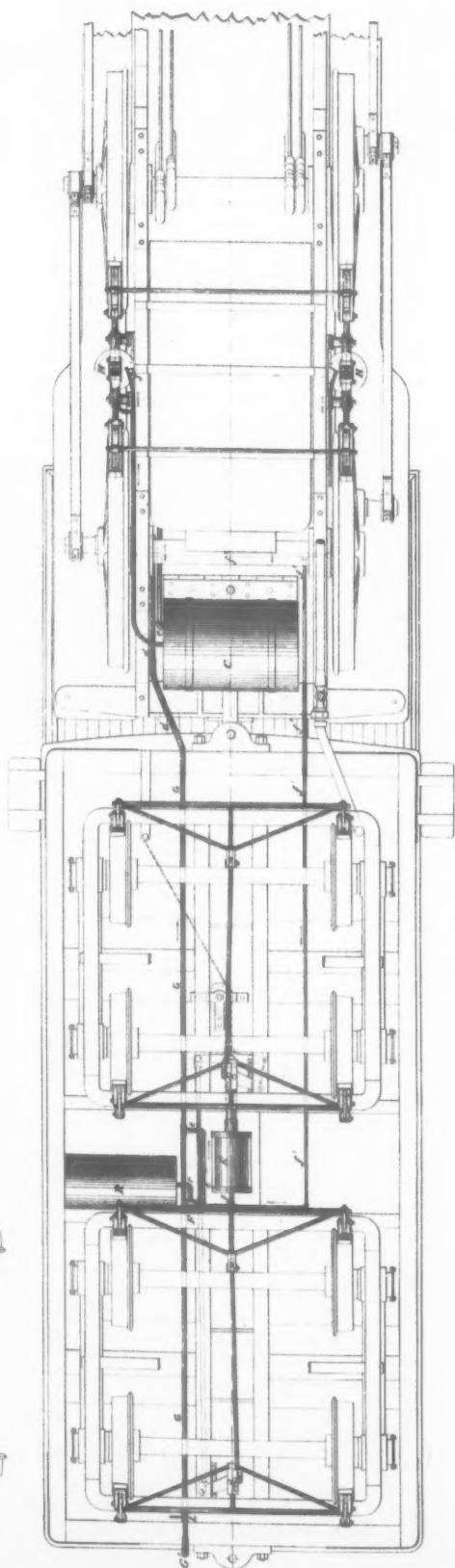


Figure 4

AM PHOTO LITHO. J. B. WILSON & CO. NEW YORK

DETAILS OF WESTINGHOUSE AUTOMATIC TRAIN BRAKE.

Figure 13

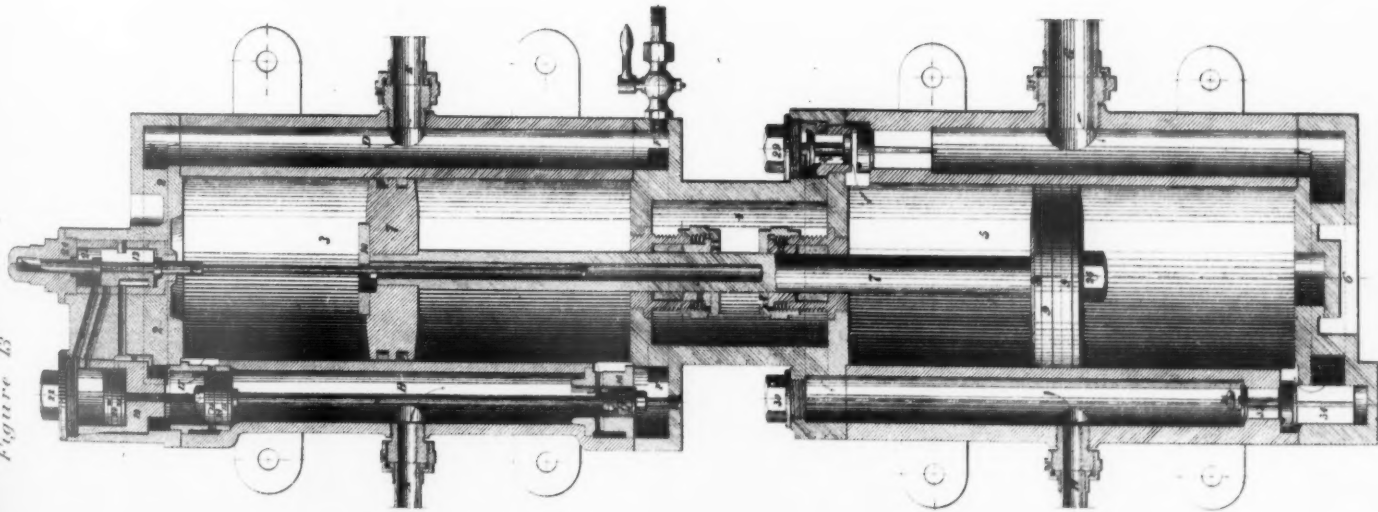


Figure 14

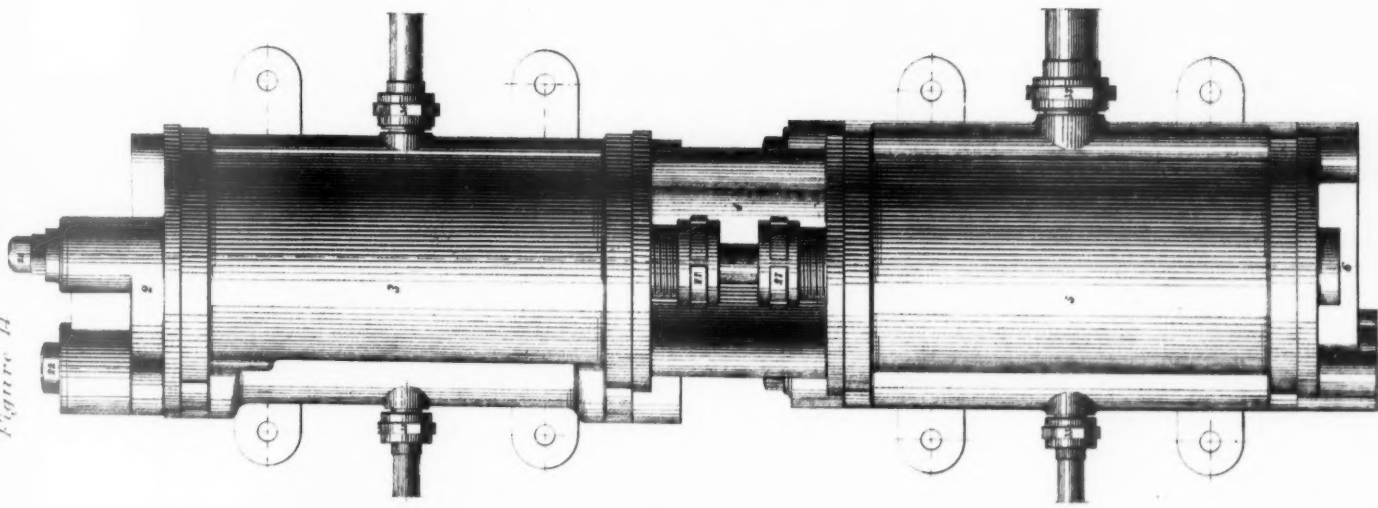


Figure 15

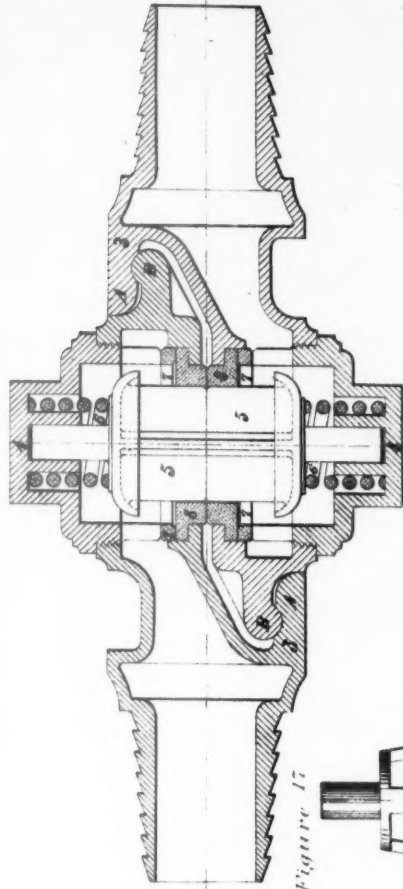


Figure 17

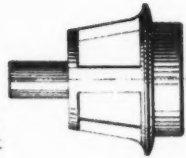


Figure 18

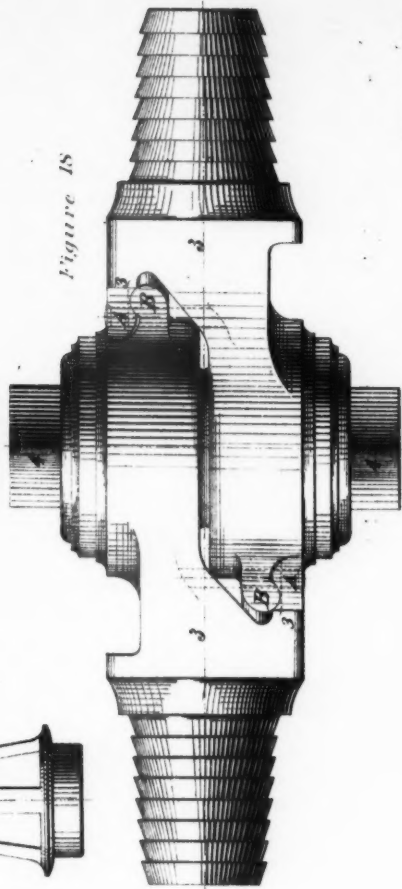


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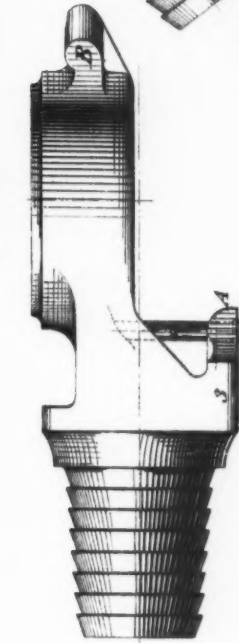


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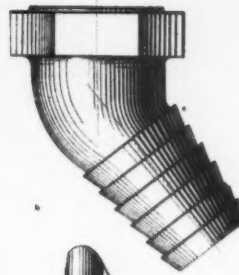


Figure 21



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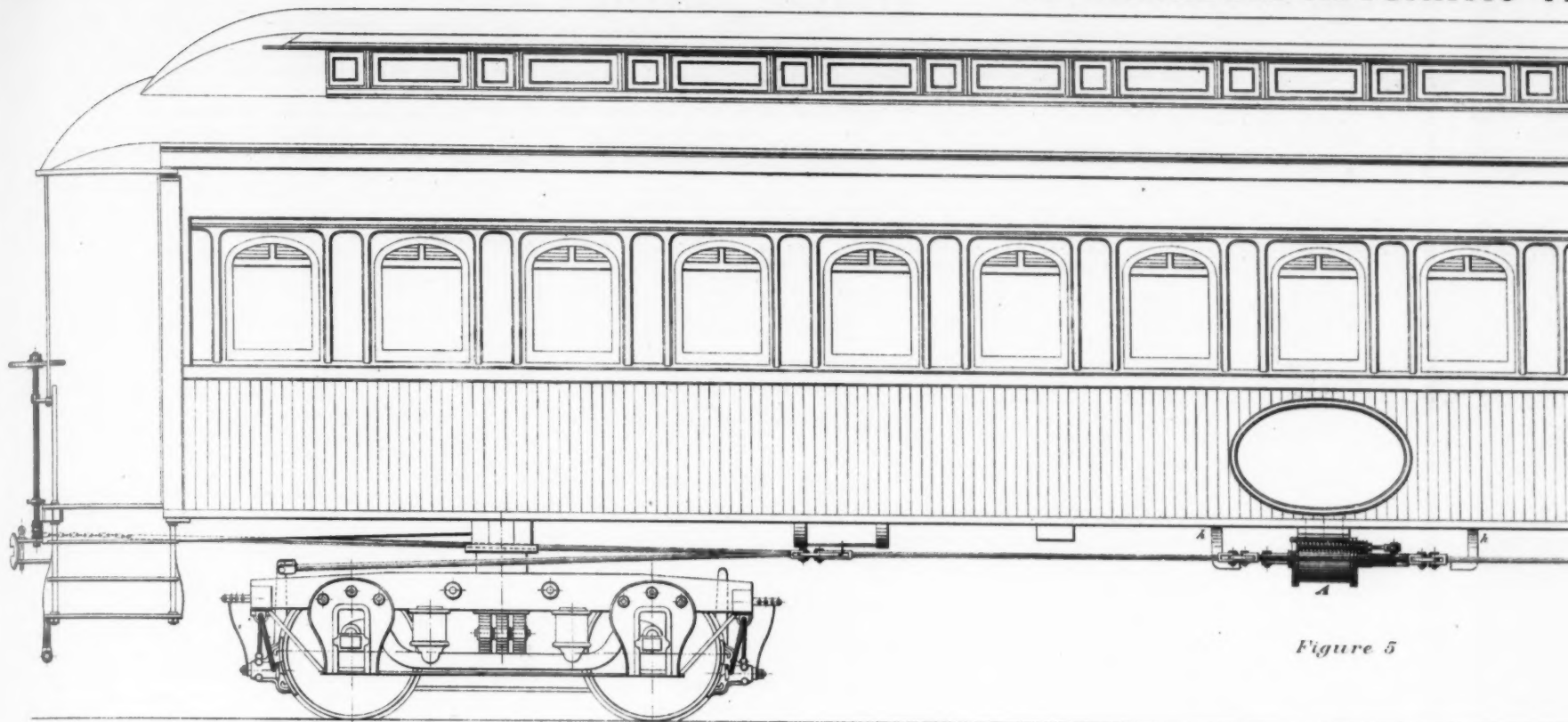


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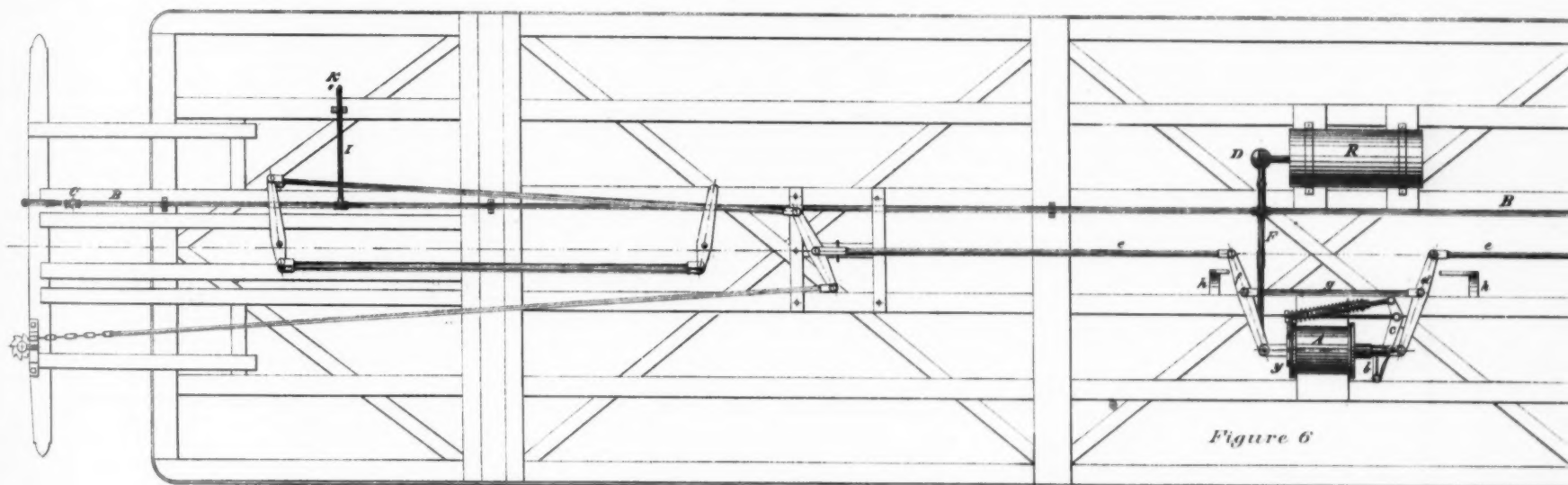


Figure 6

Figure 7

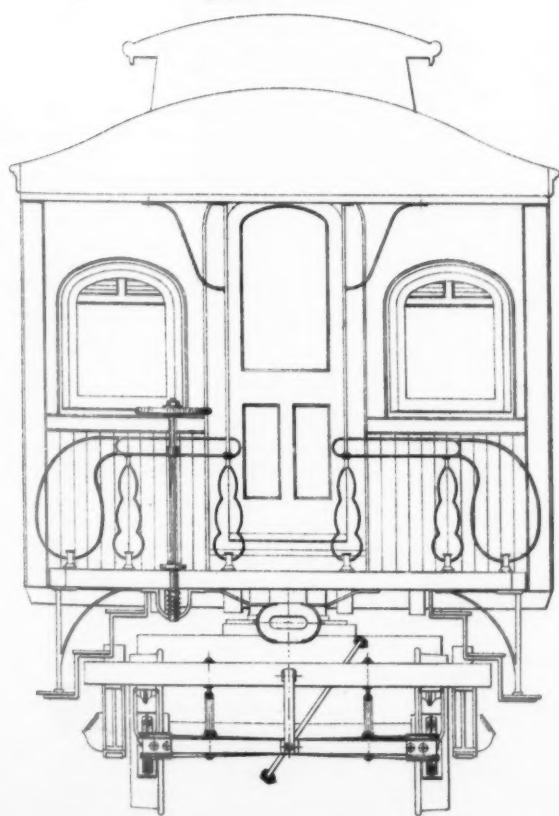


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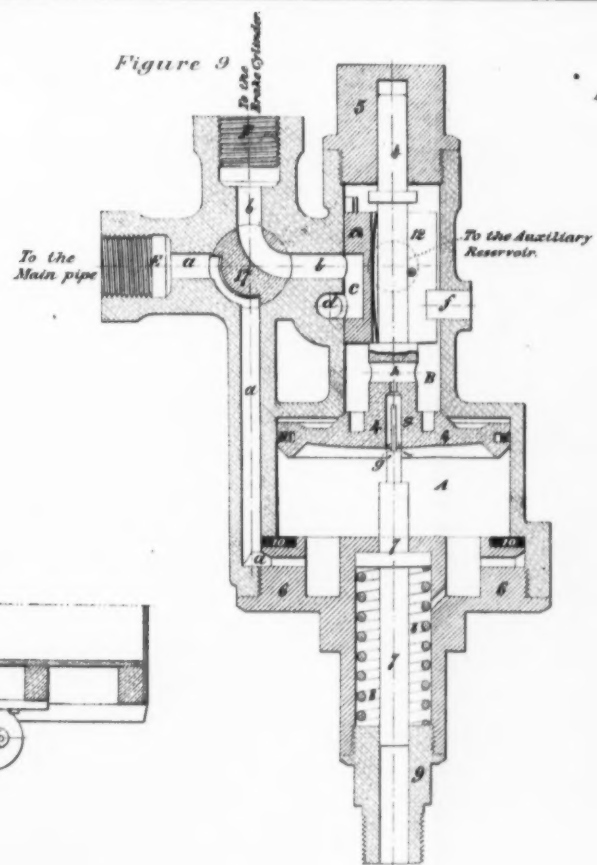
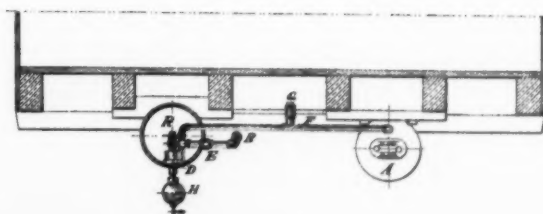
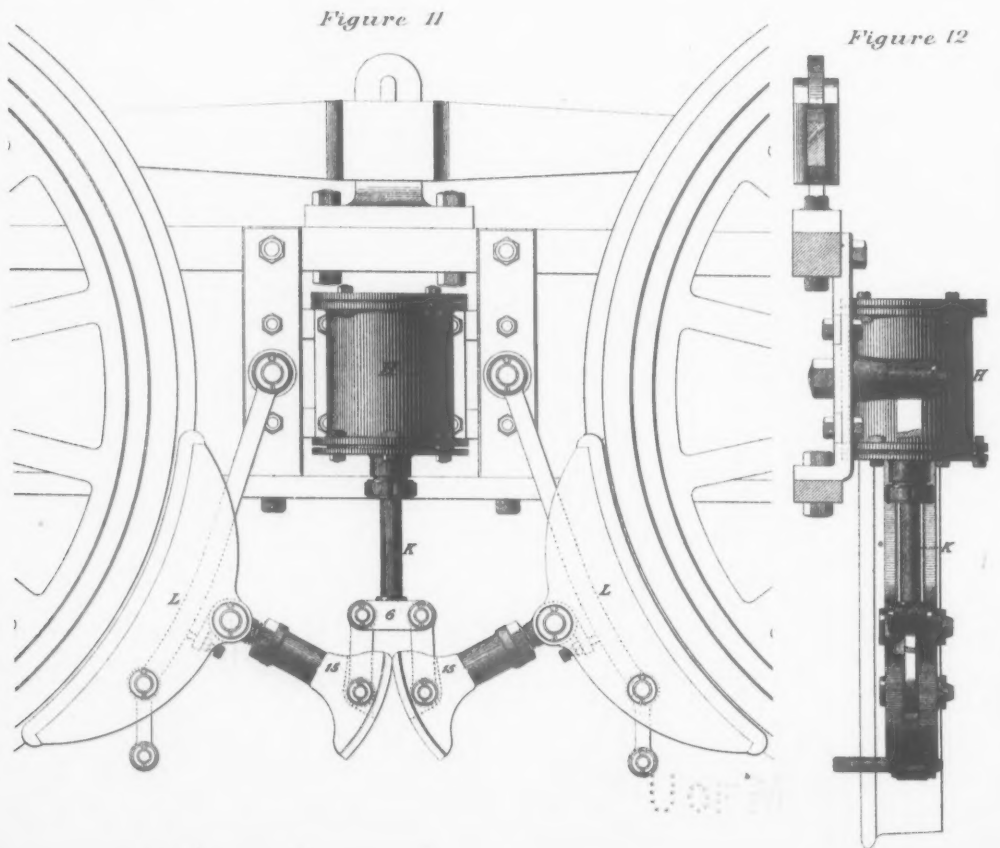
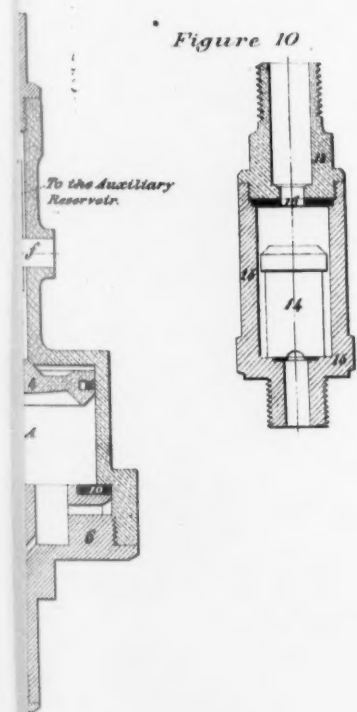
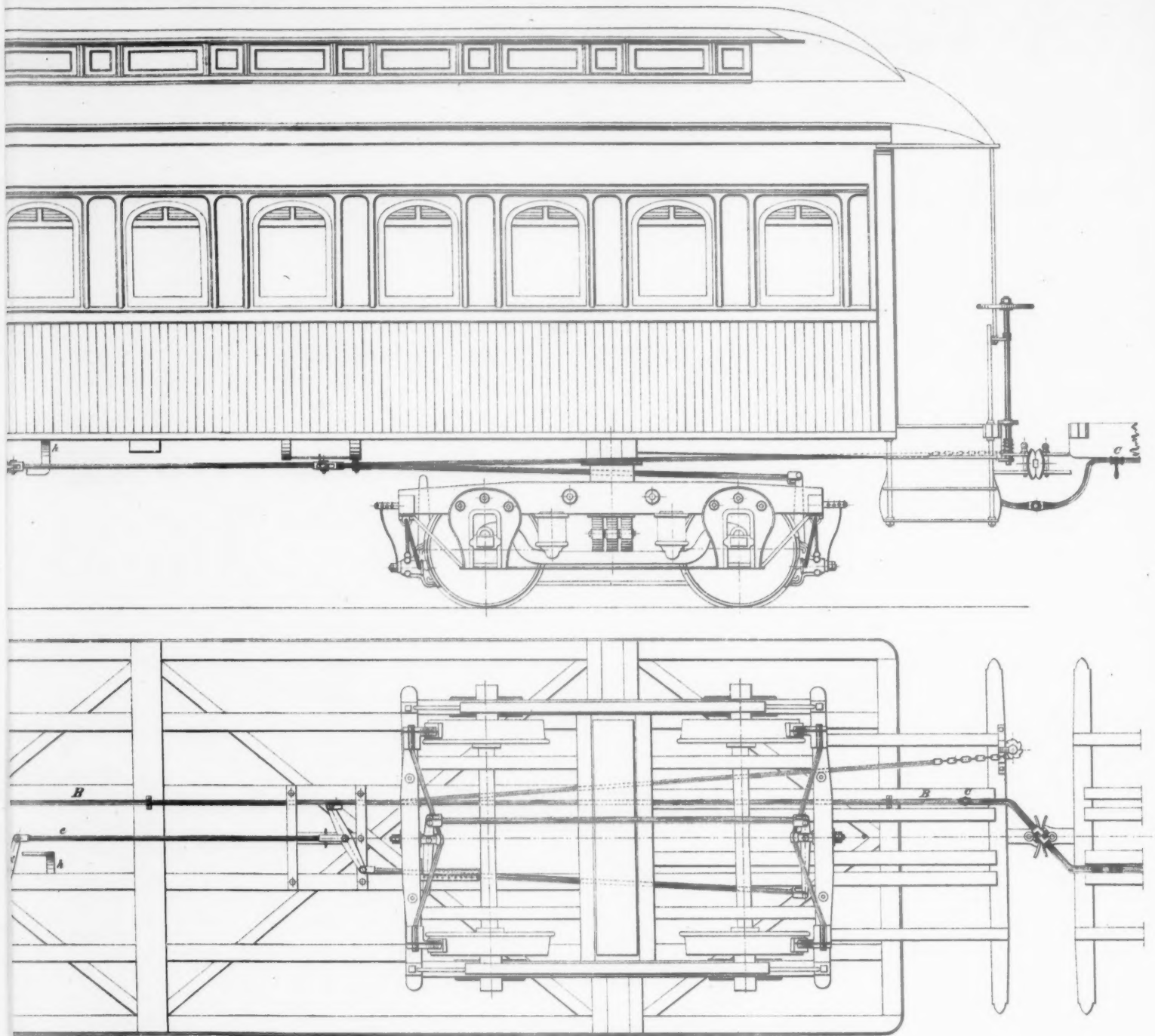
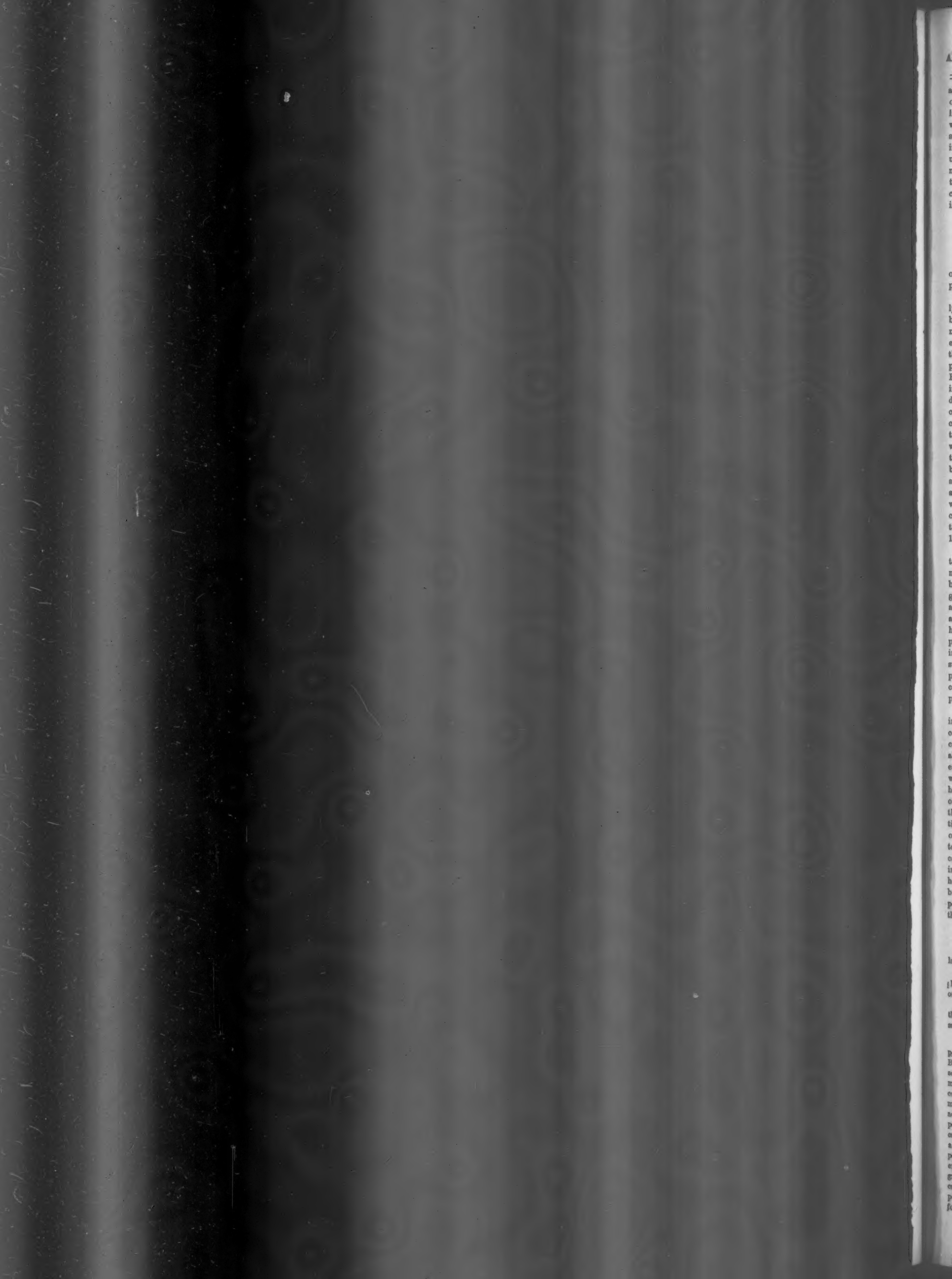


Figure 8



OMATIC TRAIN BRAKE.





a sign of prosperity in 1876 as of the very bad condition of things in 1875, when a very severe winter made traffic light, and also made it difficult to carry what little was offered. An examination of the returns of the amounts of leading articles of commerce made this year, in comparison with the amounts for previous years, shows unmistakably the upward progress of traffic, which in most of the staples which are hauled considerable distances is decided. Thus for the first quarter of 1876, as compared with 1875, in the great staples whose movement is recorded, there have been increases as follows:

14% per cent. in the grain receipts at Northwestern ports;
50 per cent. in the grain shipped from Northwestern ports;
20% per cent. in the grain received at Atlantic ports;
33% per cent. in petroleum exports;
30% per cent. in seaboard cotton receipts;
26% per cent. in cotton exports;

Against these we have a decrease (for the whole season) of 9 per cent. in the weight of the hogs packed and of 2.8 per cent. in shipments of anthracite coal.

The movement during the first quarter of 1875 was greatly obstructed by the extremely severe weather, which blocked many railroads and checked many kinds of business. This year the season has been open and the roads easily worked, but in many quarters the very mildness of the winter kept the country roads in such condition that produce could not be hauled to the railroads for shipment. But if we compare the grain movement this year with that in seasons preceding 1875, we find it large without precedent in almost every particular. An exception is the receipts of grain at Northwestern ports, which were 14% per cent. larger than in 1875 and nearly 6 per cent. larger than in 1873, but 15 per cent. less than in 1874. Northwestern ports' shipments were not only 50 per cent. greater than in 1875 (which, as we have said, was a bad year), but 16 per cent. greater than in the remarkable year 1874 and 80 per cent. greater than in 1873. The receipts at seaboard on the Atlantic, 20% per cent. greater than in 1875, were 11% per cent. greater than in 1874, and nearly 100 per cent. greater than in 1873. The petroleum movement, a third greater than last year, was a tenth greater than in 1874, and a half greater than in 1873.

In grain and petroleum then, the business of the quarter was not only comparatively but positively good—not merely better than in the bad last year, but than in the best of preceding years. The cotton movement, which is governed chiefly by the crops, is this year larger than in any preceding year without exception, we believe. The anthracite coal movement, which is generally irregular, has been very light; the provision traffic, which is an important one, though lower than last and the three preceding years, was still heavy. If we were to judge by the staples enumerated above, we should have to conclude that production has been exceptionally active, and that the community and the railroads which serve it must be prosperous.

Unfortunately, these great staples, though of immense importance, form but a fraction of the total traffic of the country, and few or no statistics of the other branches are collected and published. Could we present, with the above, statistics of the movement of bituminous coal everywhere, ore, lumber, live stock and some other articles, we should have a key to the situation. What we have, however, is, on the whole, very favorable. The season is one in which the railroads usually hope to make more than their average profits, not having to meet the competition of cheap water lines. Sometimes, as last year, the opportunity is destroyed by the great severity of the winter, limiting traffic and increasing expenses; at others, contests between lines drive rates down below cost. During the first quarter of the current year, however, not only has the movement of traffic staples been unusually large, but in most cases rates have been maintained, while expenses were unusually small. It is reasonable to suppose that there has been a reasonable profit.

Record of New Railroad Construction.

This number of the Railroad Gazette has information of the laying of track on new railroads as follows:

College Hill.—Completed from junction with Cincinnati, Hamilton & Dayton in Cincinnati to College Hill, 3 1/2 miles. It is of 3-foot gauge.

This makes a total of 308 miles of new railroad completed in the United States in 1876, against 183 miles reported for the same period in 1875, 903 miles in 1874, and 535 in 1873.

THE OPENING LAKE RATES are discouragingly low, 4 1/2 cents per bushel on wheat being given as the price from Chicago to Buffalo—quite as low as rates opened last year. There is this season a much greater stock of grain in the Northwest to be moved to the seaboard. There is especially a great deal of corn, and corn bears a good price, so that a heavy movement may be expected, which will be of great advantage to the lines carrying grain to lake ports, but cannot be shared at remunerative rates by roads carrying from lake ports eastward. Doubtless they will carry a good deal, especially of that consumed at interior Eastern points; but their profits must be infinitesimal if not nil. These excessively low lake rates also tend to prevent a profitable grain traffic on the railroads which cross Illinois south of Chicago. They have become accustomed to the circumstances, perhaps, but the situation is very trying to their bondholders; for most of these roads are bankrupt. We do not believe that

the trunk lines need regret that rates are so low on the lakes, so far as grain traffic is concerned. Not much is to be made out of that at best; and good deal is to be made from the increase in other traffic which is the consequence of large receipts for grain by Northwestern farmers.

Headquarters of the Master Mechanics' Convention.

The Committee of Arrangements for the ninth annual meeting of the American Railway Master Mechanics' Association have been notified that the convention will meet in Philadelphia, on Tuesday, May 16, 1876.

The Aubrey Hotel, on the European plan, will then be opened, and the Committee have made arrangements with the proprietor for the accommodation of members.

The above hotel is new, and located near the Pennsylvania Railroad depot, and is accessible to the principal street railroad lines. The rates for rooms will be from three to four dollars per day, according to location. Meals will be furnished at the restaurant of the hotel if desired.

Members are requested to notify the Committee, and those who will be accompanied by ladies will please give notice as early as possible, that rooms may be reserved for them.

COLEMAN SELLERS,
No. 1,400 Hamilton street, Philadelphia. } Committee.
W. B. BEMENT,
E. H. WILLIAMS,

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Chicago & Alton.—At the annual meeting in Chicago, April 3, the three directors whose term then expired were re-elected for three years, as follows: John Cramer, Chicago; John J. Mitchell, St. Louis; Lorenzo Blackstone, Norwich, Conn.

Mississippi River Bridge Co.—At the annual meeting in Chicago, April 3, the following directors were chosen: T. B. Blackstone, John J. Mitchell, John B. Drake, George Straut, H. V. P. Block. The company is controlled by the Chicago & Alton and owns the bridge over the Mississippi at Louisiana.

Joliet & Chicago.—At the annual meeting in Chicago, April 3, the following directors were chosen: John Cramer, T. B. Blackstone, John B. Drake, D. Willis James, J. McGregor Adams. The road is leased to the Chicago & Alton.

St. Louis, Jacksonville & Chicago.—At the annual meeting in Chicago, April 3, the following directors were chosen: T. B. Blackstone, John Cramer, George Straut, Chicago; Josiah Sawyer, Tremont, Ill.; N. W. Green, Pekin, Ill.; L. A. Weston, Whitehall, Ill.; C. D. Hodges, Carleton, Ill. The board subsequently re-elected George Straut President; T. B. Blackstone, Treasurer; Robert H. Nolton, Secretary. The road is leased to the Chicago & Alton.

Detroit, Lansing & Lake Michigan.—At the annual meeting in Detroit, Mich., April 4, the following directors were chosen: James F. Joy, Detroit; Nathaniel Thayer, W. F. Weld, John A. Burrham, H. H. Hunnewell, John W. Brooks, George O. Shattuck, Charles L. Young, Charles Francis Adams, Jr., Nathaniel Thayer, Jr., Charles Merriam, Boston.

Nevada County.—Mr. John F. Kidder has been appointed Superintendent.

Junction.—At the annual meeting in Philadelphia, April 3, Mr. Isaac Hinkley was chosen President, with the following directors: Franklin B. Gowen, Charles E. Smith, Thomas A. Scott, George B. Roberts.

Erie.—Mr. John A. Hardenberg has been appointed Purchasing Agent in place of Col. Henry Bowman. Mr. John A. Outwater is appointed Auditor of Disbursements, in place of D. E. Hervey, deceased.

Pittsburgh, Washington & Baltimore.—At a meeting of the directors of this company in Pittsburgh, April 4, Charles Donnelly and John D. Scully, of Pittsburgh; W. H. Koontz, of Somerset, Pa., and M. Markle, of Greensburg, Pa., were chosen directors in place of Wm. Keyser, George R. Dennis, W. H. Perkins and H. G. Vickery, resigned. The two last were originally chosen as representatives of the Baltimore city interest, now owned by the Baltimore & Ohio Company.

Baltimore, Pittsburgh & Chicago.—At the annual meeting in Newark, O., April 4, the following directors were chosen: W. C. Holgate, Defiance, O.; A. D. Smith, Washington Cowen, Columbus, O.; W. C. Quincy, Newark, O.; George R. Dennis, Frederick, Md.; Wm. Keyser, John K. Cowen, Baltimore. The board elected W. C. Quincy, President; B. C. Winstanley, Secretary.

Baltimore, Pittsburgh & Chicago, Indiana Division.—At the annual meeting in Garrett, Ind., April 5, the following directors were chosen: W. C. Quincy, Wm. Keyser, A. P. Edgerton, Geo. R. Dennis, S. J. Anthony, David Lee. The board elected W. C. Quincy, President; E. C. Winstanley, Secretary; W. H. Hams, Treasurer; James L. Randolph, Chief Engineer. The road is worked by the Baltimore & Ohio.

Missouri Pacific.—The new receivers have appointed D. R. Garrison General Manager and Warden Cummins, late Superintendent Eastern Division, Acting General Superintendent.

Atlantic & Pacific.—The new receivers have continued Mr. C. W. Rogers as General Superintendent, his jurisdiction, however, being now limited to the Atlantic & Pacific Railroad proper.

Chicago, Burlington & Quincy.—Mr. F. D. Munson has been appointed Superintendent of the new Hannibal Division, formerly the Quincy, Alton & St. Louis road.

Cincinnati, Richmond & Fort Wayne.—At the annual meeting in Richmond, Ind., April 6, the following directors were chosen: A. F. Scott, J. H. Moorman, Elwood Patterson, C. F. Coffin, Wm. Parry, A. Stone, Arthur McKew, David Studebaker, Pliny Hoagland, F. H. Short, J. N. McCullough. The board elected Wm. Parry, President; A. F. Scott, Vice-President; C. C. Binkley, Secretary and Treasurer. The road is worked by the Grand Rapids & Indiana Company.

Gulf, Colorado & Santa Fe.—Major J. P. Fransenius has been appointed Chief Engineer.

Frankfort, St. Louis & Toledo.—The first board of directors of this newly organized company is as follows: Wm. B. Carter, Robert G. Bennetfield, Alexander B. Given, Samuel Ayres, Henry Y. Morrison, Adam Blinn, John G. Clark, David F. Allen, George A. Smith. The company's office is at Frankfort, Ind.

Missouri, Kansas & Texas.—Mr. John H. Sullivan is appointed Superintendent of the Missouri and Sedalia Divisions, his appointment to take effect April 11. He succeeds Mr. J. J. Frey, resigned.

Toledo & St. Louis.—This company was organized in Indianapolis, April 7, by the election of the following directors: J. V. Banta, David Hinford, C. J. Brundage, Geo. A. Dent, W. H. Durham, M. B. Garten, Samuel Harding, John Lee, Joseph Milligan, J. C. Silvers, Philip Smithurst, C. W. Waterman, S. C. Willson. The board organized by electing the following officers: President, Col. S. C. Willson, Crawfordsville, Ind.; Vice-President, John Lee, Crawfordsville, Ind.; Secretary, J. M. Smith, Clinton, Ill.; Assistant Secretary, George H. Hurley, Treasurer, W. H. Durham, Crawfordsville, Ind.

Des Moines, Winterset & Northwestern.—At the annual meeting in Des Moines, Ia., April 4, the following directors were

chosen: B. F. Allen, C. D. Bevington, C. H. Gatch, J. J. Hutchings, N. W. Mauger, B. F. Murray, H. F. Royce, F. R. West, Thomas S. Wright. The board elected officers as follows: President, C. D. Bevington; Vice-President, F. R. West; Treasurer, W. W. McKnight; Secretary, H. F. Royce; Executive Committee, B. F. Allen, C. D. Bevington, F. R. West. The road is leased to the Chicago, Rock Island & Pacific.

Erie.—Mr. Octave Chanute has been appointed Assistant General Superintendent, and will have especial charge of the road and property of the company. Mr. Chanute is widely known as a very able engineer; he was lately Chief Engineer of the Erie, and was formerly for some time Chief Engineer and Superintendent of the Leavenworth, Lawrence & Galveston, the engineer of the Kansas City Bridge (the first of the Missouri River bridges), and was earlier engineer of the Chicago & Alton.

Burlington & Southwestern.—At the annual meeting in Barton, Ia., March 23, the following officers were chosen: Elijah Smith, President; J. A. Ostrander, Secretary and Treasurer; John W. Smith, Transfer Agent.

Frederickton.—At the annual meeting in Frederickton, N. B., April 7, the following directors were chosen: Sheriff Temple, A. F. Randolph, Julius L. Inches, E. R. Burpee, H. D. McLeod. Mr. John Richards was elected Secretary and Treasurer.

Karna City & Butler.—The first board of directors consists of S. C. Karna, W. Jarker, R. L. Brown, H. B. Fullerton, W. C. Mobely, W. E. Karna, H. W. Karna.

Arkansas Central.—The United States Circuit Court has appointed Mr. A. H. Johnson Receiver. Mr. Johnson will operate the road as Receiver and General Manager.

Chicago & Lake Huron.—The United States Circuit Court has appointed Mr. Wm. L. Bancroft Receiver of both divisions of this road. He has been Receiver of the Peninsular Division for some time.

Galveston, Houston & Henderson.—At an adjourned meeting held in Galveston, Tex., March 30, the following directors were chosen: A. P. Lufkin, N. B. Yard, H. B. Andrews, John Sealy, Galveston, Tex.; J. H. Hutchings, H. M. Hoxie, Ira H. Evans, D. S. H. Smith, James A. Baker, R. S. Hayes, Houston, Tex.; T. W. Peirce, Boston. The new directors are Messrs. Evans and Baker, who replace E. S. Wood, W. H. Nichols and Moses Taylor. The board elected John Sealy, President; H. M. Hoxie, Vice-President and General Manager; J. E. Fisher, Secretary; J. H. Hutchings, Treasurer. Mr. Sealy has been Vice-President. Mr. Hoxie is General Superintendent of the International & Great Northern. The changes point to an increased influence of that company in the management.

International & Great Northern.—At the annual meeting in Palestine, Tex., April 3, the election for directors resulted as follows: R. S. Hayes, H. M. Hoxie, D. S. H. Smith, Ira H. Evans, W. J. Hutchings, Houston, Tex.; Samuel Sloan, Moses Taylor, J. S. Barner, T. W. Pearsall, New York. There is no change from last year. The board elected Samuel Sloan, President; R. S. Hayes, Vice-President; D. S. H. Smith, Treasurer; Jacob S. Wetmore, Assistant Treasurer; Ira H. Evans, Secretary; H. M. Hoxie, General Superintendent.

Long Island.—At the annual meeting in Long Island City, N. Y., April 11, the following directors were chosen: Conrad Poppenhusen, Herman C. Poppenhusen, Alfred L. Poppenhusen, Adolph Poppenhusen, Herman Funke, Wm. A. Havemeyer, David N. Ropes, Wm. Keran, Morris Franklin, E. B. Hinsdale, E. E. Sutton, E. B. Sprague, F. B. Wallace. The board elected Conrad Poppenhusen President; Herman C. Poppenhusen, Vice-President and Treasurer; E. B. Hinsdale, Secretary. As was expected, there was a complete change, the board and officers being now substantially the same as those of the Flushing, North Shore & Central.

Great Western, of Canada.—Mr. Charles K. Domville has been appointed Locomotive Superintendent. He has been for several years Chief Engineer and Locomotive Superintendent of the Belfast & County Down Railway in Ireland.

Spartanburg & Asheville.—Mr. W. H. Inman, of New York, has been chosen a director in place of B. W. Allen, resigned.

Baltimore, Pittsburgh & Chicago—Illinois Division.—At the annual meeting in Chicago, April 6, H. Waite and J. B. Ludington were chosen directors for three years. The board re-elected W. C. Quincy President; E. V. Winstanley, Secretary; W. H. Hams, Treasurer; J. L. Randolph, Chief Engineer. The road is worked by the Baltimore & Ohio.

Allegheny Valley.—At the annual meeting in Pittsburgh, April 11, the following directors were chosen: John Scott, Wm. M. Lyon, D. A. Stewart, B. F. Jones, Pittsburgh; Thomas A. Scott, George B. Roberts, H. M. Fulton, Henry M. Phillips, A. J. Cassatt, Philadelphia.

PERSONAL.

Judge Isaac Fletcher Redfield, who died in Charlestown, Mass., March 23, was a noted railroad and corporation lawyer. He was born in 1804, and was a judge of the Vermont Supreme Court from 1836 to 1861, being Chief Justice the last four years. In 1861 he resigned and removed to Boston, where he practised law, much of his time, however, being employed in the production of several law treatises, which are regarded as standard works. Among them are the "Law of Railways," the "Law of Carriers" and "Leading American Railway Cases."

The Railroad Committee of the Massachusetts Legislature, having investigated the charges against Mr. A. D. Briggs, reports that no fault whatever can be found with Mr. Briggs' official action, and that there is no doubt that he did receive from the Governor and Attorney General verbal assurances that his connection with the bridge-building firm was not incompatible with his position as Railroad Commissioner. At the same time it is recommended that the law be amended so as to define more clearly what is required by the State in similar cases.

RAILROAD LAW.

The Validity of the Westinghouse Brake Patents.

We noticed some time ago that in the suit of George Westinghouse, Jr., against the Gardner & Ransom Air Brake Company, for infringement of the Westinghouse air brake patents, the United States Circuit Court for the Northern District of Ohio (Justice Swayne and District Judge Welker on the bench) decided in favor of Westinghouse, and issued a decree enjoining further infringement.

The case was elaborately argued, the printed record covering about 750 pages, and nearly 30 patents and provisional specifications were presented as evidence of want of novelty and priority in the Westinghouse patents. The plaintiff charged infringement of claims 1 to 7 of re-issue 5,504 of original patent No. 88,929, and claim 3 of re-issue 5,506 of original patent No. 115,667, granted to Westinghouse, and claims 1 to 4 of patent No. 64,437, granted to Barney Mee and assigned to Westinghouse. The defendant claimed protection by patents granted to Gardner, Ransom & Martin, to J. W. Gardner and to Gardner & Ransom, the latter for coupling valves for steam and air brakes. These were claimed as valuable improvements on the Westinghouse apparatus. The court says: "While we are not disposed to dispute the ingenuity and utility of these devices, and particularly the defendant's apparatus for releasing the brakes, and which may be, and no doubt is, a valuable additional improvement, we are nevertheless of opinion that the air brake apparatus, as constructed and used by defendant, although embracing these alleged improvements, does infringe

the Westinghouse and Mee patents above referred to, and that these improvements will not justify the appropriation and use by the defendant of that which has been patented to others. The right granted under complainant's patents is exclusive, and the infringement clearly proven."

Charges that re-issues 5,504 and 5,506 were for substantially different inventions from those described by original patent and that certain claims were void from ambiguity, were decided not to be well founded.

The chief contest seems to have been as to the novelty of the invention, and many patents and much expert testimony were offered in support of this plea. As to the 4th and 5th claims of re-issue 5,504, the patents of Walber, Goodale, Wright, Fullerton, Weeks and Carson, in the United States, and those of Harris, of Du Tremble & Martin and the provisional specification of Michael Siegrist were specially cited. The court said:

"We are satisfied that none of these patents or specifications can have the effect claimed for them by defendant. Some are later in date than complainant's invention (even if otherwise sufficient); some are too general, indefinite and ambiguous in their descriptive parts to constitute an anticipation of that which the complainant has patented and introduced into general public use almost the world over, with most marvelous results in point of increased safety to life and property; and those that are clear and intelligible in their terms, fall short in one or more material respects of containing the subject matter of the claims referred to.

"The same patents and provisional specifications, as well as a number of others, are relied upon by defendant as anticipatory of the first three and the sixth claims of re-issue 5,504; and particularly among such additional references were the patents of Miller, January 2, 1855; Hollingsworth (English), No. 2,886, of 1853; McInnes (English), No. 2,594, of 1864; and Kendall (English), No. 3,083, of 1864. As to all of these in their bearings on the claims last above referred to, our opinion is the same as above stated. They go to show that Westinghouse

others. The patent of Heneage, of Aug. 16, 1859, in some respects closely resembles it; but it, as well as the other prior patents cited in the defendant's supplemental brief, Kreuter, Frazer & Dunbar—fail to embody the complete invention, and hence necessarily fail to invalidate the claims of Mee."

Recovery for Legal Services to a Corporation.

In Southgate against the Atlantic & Pacific Company, the plaintiff, an attorney, brought action to recover the reasonable value of certain professional services, alleged to have been rendered defendant, and of certain other services rendered another corporation, which, it is alleged, the defendant promised after the services had been rendered to pay.

The Missouri Supreme Court held:

1. The power of the officers of a corporation to employ counsel is implied, and need not be proved. Such officers have power to engage attorneys without receiving any express delegation thereof.
2. To prove the value of certain services, the evidence should show what those particular services are reasonably worth, not what is the value generally.
3. To bind a corporation, it is not enough to show an act of the Legislature which states that the corporation assumes certain liabilities, but evidence must be given showing that the corporation accepted the act.
4. In Missouri interest on account is not allowable until after demand of payment has been made.

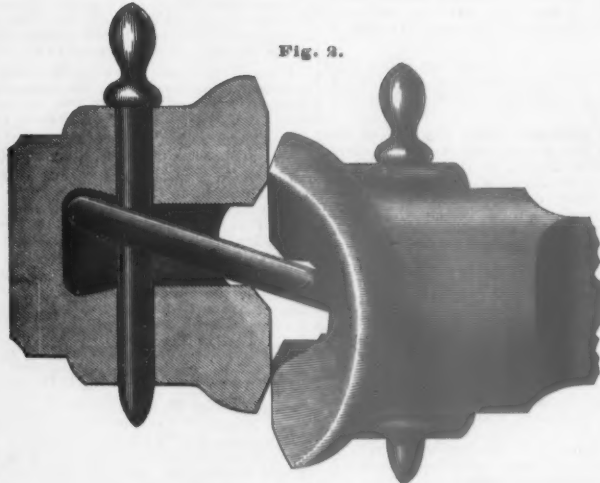
Safford's Safety Draw-Bar.

This invention consists of a cast-iron draw-head with a recess on each side which gives sufficient room after the two heads have come in contact, as shown in fig. 1, for a person's hand in taking hold of the coupling link. Even if the two draw-bars are not of the same height, as shown in fig. 2, the

Fig. 1.



Fig. 2.



SAFFORD'S SAFETY DRAW-BAR.

was not the first to conceive the idea of operating railway brakes by air pressure, and that he was not the inventor of the larger part of the devices employed for such purposes. But such fact does not detract at all from the merit or rights of a successful inventor. The organisms covered by the fourth and fifth claims of his patent re-issue 5,504, seem to have been entirely new with him; and the incorporation of these elements, together with that of graduating the air pressure in the brake cylinders—also shown to be new and of the highest importance and utility—in claims 1, 2, 3 and 6, with other substantial and material differences not necessary to enumerate, fully substantiate his pretensions as an original and meritorious inventor, and entitle him as such to the amplest protection of the law.

"Suggestive as these prior patents and provisional specifications may have been, they do not, any of them, embody that which Westinghouse has invented and claimed; and a prior description of a part cannot invalidate a patent for the whole. The same rule applies in patent law as in mathematics.

"So far as appears from the testimony in this case, none of the alleged prior inventions of air brake apparatus have ever successfully been applied to practical use; and when we consider the immense importance of the introduction of the air brake on railroads, and the incalculable benefit which it has conferred on the public, in the readiness and certainty with which trains can thereby be controlled, and the comparative immunity from accidents thus secured, and also the number of devices which have been patented for this purpose, in connection with the fact that Westinghouse was the first, so far as appears in the record and proofs, to put an air brake into successful actual use—such considerations only strengthen and confirm the soundness of the conclusions to which a careful examination of these prior patents has led us—that there are substantial and essential differences between these prior patents and the Westinghouse apparatus, and that to these differences we may justly attribute the successful and extensive introduction of the Westinghouse air brake.

"Our conclusions as to the novelty of the invention claimed by the Mee patent are the same as those in reference to the

recess in one of these heads gives sufficient room to protect a person from accident. The form of the face of the draw-head also permits of the use of this pattern with any of the other styles in use. It is claimed by the inventor that its "resisting points are in line with the draw-bar body," and therefore that it is stronger than any other pattern, and that it is in use on many of our leading railroads and that its operation has been very satisfactory. If it accomplishes what is claimed for it, and gives to unfortunate brakemen that immunity from accident which it aims at, every humane person must recommend its use. It seems to be worthy of the attention of all railroad managers who have any regard for the safety of those whom they employ. The perfectly brutal disregard for the safety of those who are employed in coupling cars is a subject which all right-thinking and feeling men are justified in regarding with righteous indignation, and any invention or device which gives a fair promise of relief from this evil is worthy of consideration.

The inventor of the draw-bar illustrated above is Mr. J. B. Safford, and his address is Buffalo, New York.

THE SCRAP HEAP.

Railroad Manufactures.

The Brooks Locomotive Works at Dunkirk, N. Y., have delivered 15 out of the 30 engines they are building for the Erie.

The Lebanon (Pa.) Rolling Mills are running double turn on plate iron for bridge purposes.

The Shenango Rolling Mill at New Castle, Pa., has shut down for want of orders.

Among the specimens of work to be sent to the Centennial from the National Tube Works Company's Mills at McKees-

port, Pa., is a piece of lap-welded iron pipe, 14 inches in diameter and 14 feet long. The iron is two inches thick. This is said to be the heaviest piece of lap-welded pipe ever made.

The Baldwin Locomotive Works at Philadelphia have two engines nearly ready for the Centennial. After the exhibition is over they will go on the Pennsylvania Railroad, for which they are built.

The Rome (N. Y.) Rolling Mill has a contract for 3,500 tons iron rails for the Burlington & Lamoille Railroad in Vermont.

The Columbus (O.) Rolling Mill has been running half time re-rolling rails, but has just received a large order for new rails.

The St. Albans (Vt.) Messenger says: "Work has commenced in the puddling department of the rolling mill, and gives employment to about 50 more men. Seven furnaces are run day and night for heating the iron to roll rails. About 150 men are employed at present in the mill."

The Rogers Locomotive Works of Paterson, N. J., will send to the Centennial an eight-wheel freight engine, 16 by 24 inch cylinders, with driving-wheels 4½ feet diameter. The engine is a wood burner, built for the Mobile & Montgomery road, and is the ordinary standard engine of the works, with a more elaborate finish than usual.

During the month of March, there was made at the Pennsylvania Steel Works, at Baldwin, 5,455 tons of steel ingots, and 5,200 tons of steel rails. This is said to be the largest quantity ever produced in one month by any Bessemer steel works.

Wilson Bohannon, manufacturer of freight-car locks, in Brooklyn, N. Y., is at work on orders for several large Western roads. He is also preparing a large case of locks to send to the Centennial.

A furnace in Chatham County, N. C., is reported by local papers to have made spiegelsteins from native ores mined in that vicinity.

The American Bridge Company of Chicago is at work on a railroad and highway bridge over the Des Moines River at Keokuk, Ia.

The Mason Machine Works at Taunton, Mass., recently shipped two engines to the Atchison, Topeka & Santa Fe.

TRAFFIC AND EARNINGS.

Cotton Movement.

For the crop year from Sept. 1 to March 31, seven months, receipts at the seaboard and exports were, in bales:

	1875-76.	1874-75.	Increase.	P. c.
Receipts.....	3,767,876	3,194,907	562,969	17.6
Exports.....	3,584,098	2,107,662	1,476,436	70.1

And for the first quarter of 1876 and 1875:

	1876.	1875.	Increase.	P. c.
Receipts.....	1,416,990	1,086,795	331,195	30.5
Exports.....	1,330,042	1,048,072	281,970	26.9

Flour and Grain Movement.

Receipts and shipments from Jan. 1 to April 1 have been as follows, flour in barrels and grain in bushels:

Flour:	1876.	1875.	Inc. or Dec.	P. c.
Lake ports' receipts.....	1,218,463	1,026,872	191,591	18.7
" " shipments.....	1,305,070	1,057,645	247,425	23.4
Atlantic ports' receipts.....	2,166,164	1,937,101	229,063	11.8

Wheat:	1876.	1875.	Inc. or Dec.	P. c.
Lake ports' receipts.....	8,694,813	9,526,158	831,345	8.7
" " shipments.....	4,068,667	3,642,345	426,322	11.7
Atlantic ports' receipts.....	4,686,701	4,415,108	271,593	6.1

Corn:	1876.	1875.	Inc. or Dec.	P. c.
Lake ports' receipts.....	14,816,122	10,711,708	4,104,414	38.7
" " shipments.....	9,885,359	4,845,150	5,040,209	103.8
Atlantic ports' receipts.....	17,692,478	13,931,788	3,760,690	27.0

Grain of All Kinds:	1876.	1875.	Inc. or Dec.	P. c.
Lake ports' receipts.....	29,277,842	25,532,432	3,745,410	14.7
" " shipments.....	17,320,478	11,543,926	5,776,552	50.0
Atlantic ports' receipts.....	27,617,883	22,857,227	4,760,656	20.8

The increase on the whole is very large, and the rate of increase is much larger in shipments from the Western cities than in the receipts there, showing that grain has been held less than usual for the opening of navigation. The grain movement for the quarter is greater in every feature than for any corresponding quarter except that for 1874, when the foreign demand joined with the large American crop and the great need of money have made it phenomenally large. The total bushels for the corresponding quarter for four years have been:

	1876.	1875.	1874.	1873.
Lake ports' receipts.....	29,277,842	25,532,432	34,545,149	27,699,631
Lake ports' shipments.....	17,320,478	11,543,926	14,948,781	9,437,543
Atlantic ports' receipts.....	27,617,883	22,857,227	24,745,881	18,930,527

Thus, except in the single item of receipts at Northwestern ports (St. Louis and Peoria are included, for convenience's sake, in "lake ports"), the movement of the first quarter of 1876 has never been surpassed; for the movement of 1873-74 exceeded that of all previous years.

Petroleum Movement.

For the period from Jan. 1 to April 1 exports have been:

From	1876.	1875.	1874.	1873.
gal.	gal.	gal.	gal.	
New York.....	28,425,141	26,814,650	30,815,062	23,404,509
Boston.....	478,310	659,261	789,496	602,708
Philadelphia.....	12,798,063	5,936,396	13,956,654	8,552,770
Baltimore.....	8,972,731	4,749,686	509,391	492,777
Total gal.....	50,674,245	38,160,601	46,070,504	33,152,764

The quarter's exports this year are 33½ per cent. greater than in 1875, 10 per cent. greater than in 1874, and 50 per cent. greater than in 1873, which latter had never been equalled before.

The shipments of crude petroleum from the Upper, Central and Lower Allegheny, Oil Creek and Bradford districts for February were as follows:

	Barrels.
Philadelphia.....	16,737
Boston.....	11,962
Pittsburgh (79,279 barrels by pipe line).....	92,477
Baltimore.....	8,076
Cleveland.....	114,993
New York.....	181,566
Outside local points.....	19,507
Refined at Oil Creek refineries, reduced to crude, shipments.....	90,407
Down the Ohio in barges.....	12,378
Total.....	519,193

The shipments for January were 677,289 barrels, the total for the two months being 1,196,482 barrels.

Opening Lake Rates.

The rates offered in Chicago last Saturday were 4½ cents for wheat, 4 cents for corn and 3 cents for oats to Buffalo—a low summer rate and about the same as last year's opening rate. Charters are noted for taking coal from Cleveland to Racine at 60 cents per ton; salt in bulk from Goderich (Canada) to Chicago at 80 cents currency; wheat from Detroit at 6 cents per bushel to Oswego, 6½ cents to Ogdensburg, 3 cents to Buffalo and 2 cents to Cleveland.

Lumber from Ottawa by Rail.

The Toronto (Ont.) Monetary Times of April 8 says: "An experiment of somewhat bold character is now being made by a Quebec timber house. They ship lumber from Ottawa to Portland by rail, and thence by steamer to Liverpool. A shipment of two million feet is now on the way at the railway rate of 11¢ per thousand feet, and sixty shillings the standard for ocean carriage. By the old freight routes the cost would be

some \$3 to Quebec and eighty shillings thence home. The difference is calculated to be largely made up in the saving of time and consequently of interest, and by the advantage of reaching market at short notice, and at a season of the year when ships could not deliver it by the ordinary method."

Opening of Navigation on Lake Erie.

The first steamer from Detroit to Cleveland went through April 4. Ice was found quite strong near the islands, but the steamer, the R. N. Rice, came by the Middle Passage, working her way through with some little difficulty.

Railroad Earnings.

The following are some of the reports made to the Secretary of State of New Jersey for the year ending Dec. 31:

	1875.	1874.	Inc. or Dec.	P. c.
Ferro Monte.....	\$14,744	\$18,530	Dec..	\$3,786 20.5
Elbernia Mine.....	24,775	48,926	Dec..	24,151 49.4
Morris & Essex.....	4,340,351	3,946,121	Inc..	394,190 10.0
New Jersey Midland.....	537,234	529,725	Inc..	7,509 1.4
Ogden Mine.....	38,441	41,958	Dec..	3,517 8.4
Sussex.....	116,610	124,445	Dec..	7,835 6.3

Other earnings are reported as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Cincinnati, Richmond & Fort Wayne.....	\$295,038	\$300,960	Dec..	\$5,922 2.0
Expenses.....	208,031	206,533	Inc..	1,508 0.7
Net earnings.....	\$87,007	\$94,427	Dec..	\$7,420 7.9
Earnings per mile.....	3.224	3.289	Dec..	.065 2.0
Per cent. of expenses.....	70.80	68.61	Inc..	2.19 3.2

Year ending Dec. 31:

	1875.	1874.	Inc. or Dec.	P. c.
Allegheny Valley.....	\$2,399,638	\$2,389,472	Inc..	\$10,166 0.4
Expenses.....	1,414,996	1,470,785	Dec..	55,789 3.8

Net earnings.....	\$984,642	\$918,687	Inc..	\$65,955 7.2
Earnings per mile.....	9.265	10,911	Dec..	646 5.9
Per cent. of expenses.....	58.97	61.85	Dec..	2.88 4.2

Burlington, Cedar Rapids & Minnesota.....	1,311,377	1,246,912	Inc..	64,465 5.2
Expenses.....	846,287	824,929	Inc..	21,358 2.6

Net earnings.....	\$465,090	\$421,983	Inc..	\$43,107 10.2
Earnings per mile.....	3.221	3.064	Inc..	.157 5.2
Per cent. of expenses.....	64.53	66.16	Dec..	1.63 2.5

Columbus & Hocking Valley.....	877,591	717,490	Inc..	160,101 22.3
Expenses.....	519,215	360,413	Inc..	158,802 44.1

Net earnings.....	\$358,376	\$357,077	Inc..	\$1,299 0.4
Earnings per mile.....	9.261	8.962	Inc..	1,799 24.3
Per cent. of expenses.....	59.25	50.20	Inc..	9.08 18.1

Three months ending March 31:

	1876.	1875.	Inc. or Dec.	P. c.
Burlington, Cedar Rapids & Minn.....	\$299,469	\$292,484	Inc..	\$6,985 14.1
Canada Southern.....	430,333	212,049	Inc..	218,284 103.0
Central Pacific.....	3,094,000	3,006,360	Inc..	87,640 2.9
Chicago & Alton.....	1,006,668	1,011,714	Dec..	5,046 0.5
Chi., Mil. & St. Paul.....	1,612,388	1,262,359	Inc..	350,029 27.8
Chi., Lafayette & Chi.....	98,929	91,474	Inc..	7,455 8.1
Hannibal & St. Joseph.....	463,727	349,597	Inc..	114,130 32.5
Illinois Central.....	1,802,067	1,668,231	Inc..	133,836 8.0
Ind., Bloom. & Western.....	379,548	318,116	Inc..	61,432 19.3
Int. & Great Northern.....	357,537	346,762	Inc..	10,775 3.1
Kansas Pacific.....	633,645	627,332	Inc..	6,313 1.0
Michigan Central.....	1,650,372	1,583,736	Inc..	66,636 4.2
Missouri, Kan. & Texas.....	766,998	628,099	Inc..	138,899 22.5
Ohio & Mississippi.....	925,312	800,830	Inc..	124,482 15.3
St. Louis, Alt. & T. H.....	120,273	102,266	Dec..	18,007 17.6
St. Louis, Iron Mt. & So.....	934,906	808,611	Inc..	126,295 15.5
St. Louis, Kansas City & Northern.....	803,396	648,234	Inc..	155,162 23.9
Tol., Peoria & Warsaw.....	314,185	206,051	Inc..	108,134 52.4

Two months ending Feb. 29:				
Chi., Burl. & Quincy.....	\$1,768,585	\$1,625,105	Inc..	\$133,477 8.2
Chi. & Northwestern.....	1,663,469	1,497,253	Inc..	166,216 11.1
Chicago, Rock Island & Pacific.....	1,034,943	1,064,489	Dec..	30,546 2.8

Month of February:				
Chi. & Northwestern.....	\$864,626	\$871,784	Inc..	\$18,158 2.7
Chicago, Rock Island & Pacific.....	544,705	502,229	Inc..	42,476 8.5

Month of March:				
Burlington, Cedar Rapids & Minn.....	\$105,843	\$97,218	Inc..	\$8,625 8.9
Canada Southern.....	165,431	83,060	Inc..	82,371 99.7
Central Pacific.....	1,133,000	1,136,263	Dec..	3,263 0.3
Chicago & Alton.....	353,719	353,627	Dec..	9,092 2.7
Chi., Mil. & St. Paul.....	567,389	502,765	Inc..	64,624 12.9
Chi., Lafayette & Chi.....	30,651	30,274	Dec..	377 0.7
Hannibal & St. Joseph.....	163,675	138,779	Inc..	24,896 17.9
Illinois Central.....	605,494	595,519	Inc..	9,975 1.7
Ind., Bloom. & Western.....	103,513	104,750	Dec..	1,237 1.2
Int. & Great Northern.....	97,531	105,599	Dec..	8,068 7.6
Kansas Pacific.....	220,097	225,474	Dec..	5,377 13.1
Michigan Central.....	583,136	611,211	Dec..	28,075 4.6
Missouri, Kan. & Texas.....	245,814	233,096	Inc..	12,719 5.5
Ohio & Mississippi.....	314,382	309,908	Inc..	4,474 1.4
St. Louis, Alt. & T. H.....	42,272	49,388	Dec..	7,116 16.3
St. Louis, Iron Mt. & So.....	295,000	295,910	Dec..	910 0.3
St. Louis, Kansas City & Northern.....	274,358	243,991	Inc..	30,367 12.4
Tol., Peoria & Warsaw.....	102,737	72,805	Inc..	29,932 41.1

Week ending March 24:				
Great Western.....	\$15,021	\$17,986	Dec..	\$2,965 16.5
Grand Trunk.....	\$39,200	\$40,300	Dec..	\$1,100 2.7

Central Pacific earnings are compared with 1874 as follows:				
Three months ending March 31.....	\$3,094,000	\$2,535,025	Increase.....	\$558,975 22.2
Month of March.....	1,133,000	882,423	Increase.....	250,577 28.4

Wisconsin Freight Rates.				
The new rates made by the Chicago & Northwestern between Chicago and the leading Wisconsin towns, which took effect April 7, are as follows:				

BETWEEN CHICAGO AND	1st class per 100.	2d class per 100.	3d class per 100.	4th class per 100.	Grain per 100.	Flour per 100.	Lumber per car.	Stock per car.
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Beacon.....	20	16	13	10	16	13	15	15
Kenosha.....	20	16	13	10	16	13	15	15
State Line.....	20	16	13	10	16	13	15	15
Beloit.....	42	35	30	25	15	30	14	25
Evansville.....	46	38	32	28	16	32	15	28
Madison.....	49	42	35	30	17	34	16	30
Baraboo.....	54	46	38	32	18	36	17	34
Wausau.....	55	47	40	34	19	38	18	36
Winona Junction.....	70	60	50	40	23	45	22	45
Marshfield.....	70	60	50	40	24	46	23	46
Fond du Lac.....	40	32	27	21	16	32	14	33
Oshkosh.....	43	36	29	24	17	34	15	35
Monroe.....	53	45	38	32	20	40	18	40

Freight Rates to Missouri River Points.								
A meeting of general freight agents of the lines interested was held in St. Louis April 6 and 7. There was much discussion and difference of opinion, the principal point of disagreement being as to the difference in rates to Kansas City from								

Chicago and St. Louis. The following rates were finally agreed upon temporarily:

	Chicago to Kansas City, Leavenworth, Atchison.	St. Louis to Kansas City, Leavenworth, Atchison.	Chicago or St. Louis to Council Bluffs.	Chicago or St. Louis to Omaha.
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First class, per 100 lbs.....	\$0.70	\$0.50	\$0.70	\$0.75
Second class, ".....	0.55	0.40	0.55	0.60
Third class, ".....	0.40	0.30	0.40	0.45
Fourth class, ".....	0.25	0.20	0.25	0.30
Special class, ".....	0.23	0.18	0.23	0.28

Salt, cement or plaster, per barrel, in car-lots.....	0.60	0.35	0.60	0.60
Class A, per car.....	70.00	40.00	70.00	80.00
Class B, ".....	60.00	35.00	60.00	70.00
Class C, ".....	50.00	30.00	50.00	60.00
Lumber, ".....	60.00	35.00	60.00	70.00
Coal, coke or pig iron, per ton.....	5.00	3.00	5.00	6.00

The St. Louis *Republican* of April 8 says: "The rates from St. Louis are not advanced, except on lumber, which is \$5 per car above old rates."

"The St. Louis lines insisted upon a greater difference in rates between St. Louis and Chicago, but the general freight agents being unable to settle this point satisfactorily, the matter was referred to the general managers to settle. In the meantime, as Chicago was charging the same as St. Louis, our lines thought best to accept temporarily the differences above referred to, as any difference was an improvement. St. Louis lines refusing to advance rates to the West until the differences were satisfactorily adjusted, a meeting of all the parties interested will probably be held in Chicago on Thursday next."

"East-bound classification is made to harmonize with all Eastern trunk lines. There is now no break in classification from the Missouri River to the Atlantic Ocean."

"A resolution was passed that issuing free passes or tickets on account of freight business shall be considered equivalent to a cut in rates."

Coal Movement.
Coal tonnages are reported as follows for the three months ending April 1:

	1876.	1875.	Inc. or Dec.	P. c.
Delaware & Hudson Canal Co.....	374,428	646,985	Dec..	272,557 42.1
Delaware, Lack. & Western.....	257,507	564,791	Dec..	307,284 54.4
Pennsylvania Coal Co.....	222,268	280,878	Dec..	26,310 11.3
Lehigh Div., Central of N. J.....	308,373	58,686	Inc..	249,687 427.2
Lehigh Valley.....	828,459	344,092	Inc..	484,367 53.6
Philadelphia & Reading.....	446,972	230,287	Inc..	216,685 94.2
Northern Central.....	52,817	172,171	Dec..	119,354 90.3
Danville Hazleton & Wilkes-barre.....	9,912	6,132	Inc..	3,780 61.6
Pennsylvania & New York.....	4,296	7,367	Dec..	3,071 41.5
State Line & Sullivan.....	14,367	3,837	Inc..	10,530 306.2

Total anthracite.....	2,220,399	2,284,626	Dec..	64,227 2.8
Semi-bituminous:				
Huntingdon & Broad Top.....	69,061	85,611	Dec..	16,550 19.3
East Broad Top.....	17,533	5,678	Inc..	11,855 203.4
Belleville & Snow Shoe.....	14,642	.....	.....	.....
Tyrone & Clearfield.....	289,951	211,995	Inc..	47,956 22.6
Cumbyland, all lines.....	267,120	257,680	Inc..	9,440 3.7

Total semi-bituminous.....	626,637	.....	.....	.....
Bituminous:				
Barclay.....	86,951	71,852	Inc..	15,099 20.0
Allegheny Region, Pa. R. R.....	47,853	38,679	Inc..	9,174 23.7
Pittsburgh.....	80,750	.....	.....	.....
Penn and Westmoreland gas coal.....	150,199	236,356	Inc..	64,053 27.1
West Pennsylvania R. R.....	54,466	.....	.....	.....
Southwest Pennsylvania R. R.....	14,944	.....	.....	.....

Total bituminous.....	435,213	346,887	Inc..	88,326 25.5
Coke:				
Pittsburgh Region, Pa. R. R.....	51,243	.....	.....	.....
Penn and Westmoreland.....	7,678	.....	.....	.....
West Pennsylvania R. R.....	11,211
Southwest Pennsylvania R. R.....	98,444

Total coke.....	168,976
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The great changes and discrepancies in the anthracite tonnage are due to the six weeks' suspension, which affected all the companies this year, and to the strike of last year, which stopped production in the Lehigh and Schuylkill regions, while the greater part of the Wyoming region was not affected. In semi-bituminous production it will be noted this year that the Clearfield coals are running the Cumberland very close.

OLD AND NEW ROADS.

A Meeting of Railroad Managers.

A meeting of managers of the leading through and trunk lines was held in Cincinnati, April 7. The meeting was private, but it is said that the greater part of the time was consumed in informal discussion of the question of summer rates, but no definite result was reached. A committee was appointed to consider the expediency of entering into a general arrangement for pooling earnings, and are to report at another meeting, to be held in Chicago, April 15.

Cleveland, Columbus, Cincinnati & Indianapolis.

Two new lines of coaches are to be put on over this road April 16. One is a line of sleeping cars to run between New York and St. Louis by this road, the Vandalia Line, the Lake Shore and New York Central. The other is a line from Indianapolis to Columbus by this company's Indianapolis Division to Union, then by the Dayton & Union to Dayton and the Cincinnati Division to Columbus.

Pullman Car Company.

This company has applied for an injunction against the Wagner Sleeping Car Company. The ground of the complaint is that license to use certain patents owned by the Pullman Company was granted to the Wagner Company, such patents to be used only east of Buffalo. Subsequently oral permission was given to run four Wagner cars through to Chicago, on condition that four Pullman cars should run to New York over the New York Central, to complete the line. Now, however, the Wagner Company has established a Chicago line of its own, and the injunction is asked for to restrain it from the use of the patents aforesaid. This is probably the beginning of a long litigation.

Rockford, Rock Island & St. Louis.

The balance which the Court allowed to remain on interest was only paid April 3 by Mr. H. Osterberg, who bought the road on account of the bondholders. The balance amounted to \$223,374.48, and its payment has been finally reported to the Court by the Master. The purchase is now completed.

Atlantic & Great Western.

A meeting has been called in London of holders of the leased line rental trust bonds of 1872 and 1873, the Western Extension trust 8 per cent. bonds, and the Western Extension trust 7 per cent. bonds for the following purposes: 1. To express the opinion of the bondholders as to the continuance in office of the present trustees of the above-mentioned several trusts, or

either of them. 2. To receive reports from the committees of the leased lines bondholders, 1872 and 1873, as to the communications which have passed between the committee and the present trustees, with reference to their resignation of the trusteeship, and to pass such resolution as may be considered advisable. 3. To decide what, if any, steps should be taken with reference to the past accounts of the respective trustees, and especially as to the amounts received by the trustees for their remuneration.

Albany & Esquehanna.

The third or six-foot gauge rail still remaining on this road, between Binghamton, N. Y., and Oneonta, has been taken up, and the road is now entirely of standard gauge. The few remaining broad-gauge cars are being altered in the Oneonta shops, and the broad-gauge engines have been sent to the Dickson Company's shops at Scranton, Pa.

Georgia.

The long and important wooden bridge over the Oconee River was destroyed by fire on the night of March 17. The building of a new bridge was begun almost before the fire was out, and arrangements for a transfer at the river were made so promptly by Superintendent Johnson that only one train missed connections at either end of the line in consequence of the loss of the bridge. The new bridge was completed April 6, although some delay was caused by high water.

Another bridge near Macon, on the Macon & Augusta road, had one span washed away and another badly damaged by the high water of April 4, which did some other damage to the road.

Tennessee & Pacific.

The County Courts of Wilson and Davidson counties, Tenn., which own most of the stock in the present company, have appointed committees to see if something cannot be done to prevent the sale of the road on account of the company's failure to pay the balance due the State on the purchase of the road.

reasons for the amendment, and also the reasons for acquiring some of the existing branches. After some discussion a vote was taken which was largely in favor of the by-law. A resolution in favor of quarterly dividends was presented, but was voted down.

The company has assumed possession of the Quincy, Alton & St. Louis road under the lease made in January last. It will hereafter be known as the Hannibal Division.

New Jersey Midland.

It is stated that the receivers, under authority of the Court, have arranged with the Rhode Island Locomotive Works a compromise of the latter's claim for ten engines now on the road. The receivers are to pay \$6,500 per engine in certificates having two years to run. The engines have been on the road over a year; one of them, we believe, was destroyed by fire some time since.

The Balesier-Dole Committee claims now to have deposited \$1,800,000 first and \$790,000 second-mortgage bonds, a majority of both issues. It is claimed for this committee that the deposit of the bonds and assessment is a legal assent to a contract, and that such assent cannot be withdrawn without the consent of the committee, and that, consequently, the claim made by the main committee that bondholders are revoking the authority given and transferring their bonds to that committee is without foundation.

Philadelphia & Atlantic City.

The projectors of the new narrow-gauge railroad from Camden, N. J., to Atlantic City have organized a company by this name under the general law. The incorporators are Charles A. Colwell, Levi C. Albertson, John J. Gardiner, Thomas C. Garrett, Mahlon R. Morse, Jacob G. Campbell, of New Jersey; W. Dwight Bell, Samuel Richards, Isaac Lloyd, Robert Craven, John S. Sickler and John E. Shaw, of Philadelphia. The distance is about 60 miles and the capital stock is fixed at \$1,800,000. It is said that the track, terminus and ferry of the Camden, Gloucester & Mt. Ephraim road at Camden will be used.

Osage Ceded Land Cases.

The United States Supreme Court has affirmed the decision of the Circuit Court in these cases, and the rights of the settlers on these lands are now fully confirmed, to the exclusion of the Missouri, Kansas & Texas and the Leavenworth, Lawrence & Galveston companies, which claimed the lands as part of their grants. A large number of persons are interested in the decision, and it closes a long and expensive litigation.

New York & Philadelphia New Line.

Formal notice is given of the opening of this line for public travel May 1. The fare between New York and Philadelphia will be \$2.65, only ten cents less than that by the Pennsylvania. The depot in Philadelphia is at the corner of Berks and American streets; in New York at the foot of Liberty street, and an additional one in New York, at Christopher street, will be established during the summer.

As has been heretofore noted, the line consists of the Central of New Jersey, from New York to Bound Brook, 31 1/2 miles; the Delaware & Bound Brook to the Delaware River, 27 miles; the North Pennsylvania's Delaware River Branch to Jenkintown, 20 1/2 miles, and the main line to Philadelphia, 9 miles, being 88 miles in all. The line will be equipped and worked as one line. The rate of fare indicates that no sharp competition with the existing line will be entered into, for the present at any rate.

College Hill.

This narrow-gauge suburban line was opened for traffic April 3. Its trains use the depot of the Cincinnati, Hamilton & Dayton road in Cincinnati, and run on the track of that road a short distance, leaving it in the Mill Creek Valley. The new road built runs through Spring Grove to College Hill and is about 3 1/2 miles long, with very heavy grades. It is intended for suburban passenger traffic.

Louisville, Harrods Creek & Westport.

It is now proposed to extend this narrow-gauge road from Louisville to Cincinnati. The country along the line is being canvassed to see what subscriptions and local aid can be secured. The general route will be parallel and near to the Ohio River, and it will be the third road connecting the two cities.

Paulding & Cecil.

A company by this name has been organized to build a railroad a few miles long in Paulding County, O. The capital stock is \$20,000.

Allegheny Valley.

It will be remembered that some time since this company brought suit against Wm. A. Tomlinson, formerly Treasurer of the company, to recover some \$52,000 which, it was claimed, he had not accounted for. In defense, Tomlinson now claims that the deficit was not made by him, but by the late President Phillips. It is well known that Phillips managed the affairs of the company entirely by himself, and that at his death they were left in great confusion. Tomlinson now claims that he paid the money to Phillips, and asks for a rule to compel the production in court of the company's books, and also of books and papers belonging to the Phillips estate, some of which are in the company's possession.

Meetings.

The following companies will hold their annual meetings at the times and places given:

Delaware & Hudson Canal, at the office, Cortlandt and Church streets, New York, May 9, at noon. Transfer books will be closed from April 25 to May 10.

Pittsburgh, Titusville & Buffalo, at the office in Philadelphia, May 1, at 11 a. m.

Kansas Pacific, at the office in Lawrence, Kan., May 4, at 1 p. m.

Missouri River, Fort Scott & Gulf, at the office in Rosedale, Kan., May 3, at 10 a. m.

Atchison, Topeka & Santa Fe, at the office in Topeka, Kan., May 12, at 3 p. m.

Missouri, Kansas & Texas, at the office in Parsons, Kan., May 17, at 1 p. m. Transfer books will close April 18.

Baltimore & Ohio.

Under the decision as to the legality of the charter tax of one-fifth of the passenger receipts of the Washington Branch, the State of Maryland has brought suit to recover the sum due for the six months from Jan. 1 to July 1, 1876. A separate suit will be brought for each half-year up to the present, but of course all except the first will be merely formal. The company put in several pleas in abatement, covering three points: First, that the act of Assembly requiring payment of the one-fifth receipts is void as relates to the four miles of the road in the District of Columbia. Second, that under the true construction of the several acts of Assembly requiring a bonus, the company is required to pay one-fifth of the receipts on the Washington Branch from the Relay to Washington; and third, that the State is not entitled to recover the capitation tax since the date of the opening of the Baltimore & Potomac Railroad, because, under the several acts relating to the Washington Branch, the company (defendant) had the exclusive privilege of transportation between Baltimore and Washington; that by the terms of the act the State contracted not to charter another company provided the Baltimore & Ohio Railroad Company should build its road within the time fixed by law; that the company did comply with the

conditions named in the law, and therefore the State, by chartering the Baltimore & Potomac Railroad Company, broke its contract, and by this breach of contract the company was deprived of a very large portion of revenue which it otherwise would have received.

The suit resulted in judgment for the State. It is said that an appeal will be taken from the Circuit Court and the case carried up to the United States Supreme Court again.

Fayetteville & Florence.

At a meeting held in Florence, S. C., March 31, President McKethan of this company stated that the road was graded from Fayetteville, N. C., to the South Carolina line, about 45 miles, leaving 35 miles in South Carolina to be built. Of this section the grading is very light, and the whole section would not cost more than \$60,000, with the exception of the Pedee River bridge and approaches, which were estimated at \$100,000. The money for this bridge and the iron were arranged for, but the \$60,000 for the grading was to be raised along the line. The statement was well received, and a considerable amount was subscribed. The road will connect at Fayetteville with the Western Railroad of North Carolina, and will give an outlet to the coal fields on the line of that road.

Spartanburg & Asheville.

The grading in South Carolina is now all finished or under contract the last contracts for the mountain section having been let recently. The whole road is under contract, the last of the work to be finished in 18 months. The contracts for the Polk County (N. C.) section are held by E. Clayton & Sons. The President has been authorized to contract for rails for 30 miles of the road. The mountain work is lighter than was expected, and no tunnels will be needed.

Cincinnati Southern.

The trustees have awarded \$3,000,000 of the additional \$6,000,000 loan authorized to Espy, Heidelbach & Co., at 100.13 and accrued interest. The bonds are to be 30-year 6 per cent. gold bonds.

Northern Pacific.

The returns of the special election held in Montana, April 11, are not yet all in, but those received indicate the defeat of the subsidy for this road by a small majority.

Dividends.

Dividends have been declared by the following companies:

Boston & Providence, 4 per cent., semi-annual, payable May 15.

Camden & Atlantic, 2 per cent., quarterly, payable April 15.

Central of New Jersey, 2 1/2 per cent., quarterly, payable April 20.

Delaware, Lackawanna & Western, 2 1/2 per cent., quarterly, payable April 20.

Pennsylvania.

The passenger-train employees of this company will soon be equipped in new uniforms. Conductors will wear double-breasted frock coats, of blue cloth, trimmed with silver-plated buttons, with the monogram of the company. Coats will button to the chin *a la militaire*. Blue caps with the word "Conductor," and decorated with three bands of gilt will constitute the head gear. Train agents will wear similar suits, with the exception that the coat will be sack cut, and two gilt bands will encircle the cap; their coats will be sack cut and their uniforms will contain no pockets. They will carry a bag or pouch for tickets. The brakemen's caps will be ornamented with one gilt band, and the train-boys' will be trimmed with red cord.

It is said that hereafter the enginemen and firemen running freight trains on the main line will not have their own engines, but be assigned to different ones from day to day as may be required. It is thought that the engines can be made to do more work under this plan. It will not, however, be at all agreeable to the men, who, as a rule, become attached to their engines, and much prefer having one of their own.

The contracts for the new passenger depot in West Philadelphia are let to Hoover, Harris & Co., of Philadelphia, Pa., and Mr. Hughes, of Bellefonte, Pa. The cost will be about \$100,000.

The California Railroad Law.

The California State Senate finally passed the bill known as the O'Connor bill, which provides for a board of three railroad commissioners to have general supervisory and advisory powers, to collect statistics and report annually. The bill also contains provisions against discrimination, and fixes as the maximum rates allowed to be charged the rates in force Jan. 1, 1876. The bill went to the Assembly and passed that body with a few unimportant amendments and one fixing maximum rates at 5 per cent. below those of Jan. 1. To this last amendment the Senate would not agree, and a conference was ordered. The Assembly finally receded from its amendments, leaving the bill to go to the Governor, who would, it is thought, sign it without objection.

Gilman, Olinton & Springfield.

In the United States Circuit Court in Springfield, Ill., April 8, a degree of foreclosure of the first mortgage was ordered to be entered, with an order to sell the road to satisfy said mortgage, after 60 days' public notice. This foreclosure and sale will end the long litigation among the stockholders.

Jefferson City, Lebanon & Southwestern.

Messrs. Chaffer & Co., who own some coal banks in Moniteau County, have offered to build a section of the road from Jefferson City, Mo., southwest about 20 miles, provided they have until Jan. 1, 1877, to complete it, and are allowed to issue mortgage bonds to the amount of \$7,500 per mile.

Indianapolis, Bloomington & Western.

By instructions of the Court the Receiver has postponed for the present all consideration of bids for furnishing new locomotives for the road, and will make no contracts without further instructions.

Receiver Wright has made a report for the three months ending March 1. In that time 12 miles of re-rolled iron were laid down and other improvements made at a cost of \$37,096.93. Mr. Wright says:

"We have had scarcely one week of steady cold weather and frozen ground, so open and mild has been the season. It is believed that not one-fifth of the crops of the last season have yet been moved. Notwithstanding this, the increase of earnings for the three months over the corresponding period of 1875 was \$88,730.73. Had the weather been cold and the country roads solid the increase would undoubtedly have been more than double this. The amount disbursed on back pay-rolls up to the first of March was \$24,319.80. Since that time the weather has been so unfavorable for business that the receiver has not been able to continue the payment of a monthly dividend as was expected. But inasmuch as business has only been delayed and the traffic is still on the line of road he believes that as soon as the highways become settled payment upon this class of indebtedness can be resumed out of the surplus earnings. The entire issue of receiver's certificates thus far is \$208,000. The total amount maturing since their issue, \$77,460.38, has been promptly met as they fell due. The remainder of the issue will mature through this year and until March, 1877. Three propositions have been received for the building of twenty locomotives for the road, ranging in price from \$8,500 to \$9,100 for each engine, the parties putting in bids proposing to receive

payment in receiver's certificates bearing 7 per cent. interest, the certificates maturing in equal amounts during twenty-four months from date of delivery; builders to hold a lien until property is paid for. Seven propositions to furnish 800 cars have been received, the highest bid being \$568 for box-cars, \$468 for coal-cars; the lowest bid \$520 for box-cars and \$410 for coal-cars; terms of payment same as in case of the engines."

Burlington, Cedar Rapids & Minnesota.

The bondholders' committee has submitted a plan of reorganization which may be summarized as follows:

1. The road and branches to be bought by a purchasing committee at foreclosure sale, for the benefit of all first-mortgage bondholders who shall accept this plan, and to be transferred to a new company to be called the "Burlington, Cedar Rapids & Northern Railway Company."

2. This company to have a capital stock of \$10,000,000 in \$100 shares, and to issue \$6,500,000 in 6 per cent. bonds dating from June 1, 1877, and running 30 years. The shares and bonds will be apportioned to holders of the present bonds as follows:

	Bonds.	Stock.	Amount to a \$1,000 bond:	Bond.	Stock.
Main Line bond-holders	\$4,320,000	\$3,780,000	\$800	\$700	
Milwaukee Division	1,100,000	1,100,000	500	500	
Muscatine Division	240,000	240,000	300	300	
Pacific Division	450,000	450,000	250	250	
Company's Treasury	390,000	4,430,000	....	....

This would reduce the funded debt from \$25,000 to \$16,000 per mile, and the yearly interest change from \$1,750 gold to \$960 currency per mile.

3. The Purchasing Committee to have power to audit claims not included in the first mortgages, and the new company to have power to assume the debts so audited and to pay them in scrip, which shall entitle the holder to its value in common stock whenever such stock previously issued to bondholders shall have received 3 1/2 per cent. dividends for six consecutive half-years.

4. If the holders of bonds of any division fail to accept this plan, the Purchasing Committee may not buy that division, and the stock and bonds apportioned to it will remain in the treasury.

The committee's circular enumerates among the claims which it may be policy to recognize, bills for supplies used in construction or operation, claims of stockholders who have given good value for their stock, and of holders of equipment bonds; especially when any of these claims are held by residents along the line. The committee says that under the Receiver suits have been brought for claims, said to have a lien on the property, amounting to more than \$200,000; this is urged as a reason for foreclosing the mortgages immediately. It says: "The sale will not take place until we hold powers of attorney for a majority of bonds so large in amount as to protect the interests of the assenting bondholders against adverse bidders tendering an inadequate price."

The Missouri Tax Cases.

In the suits brought by the Missouri, Kansas & Texas, the St. Louis, Iron Mountain & Southern, the Chicago & Southwestern, the Atlantic & Pacific and the Pacific companies to restrain the collection of taxes levied upon them for the year 1873, the United States Circuit Court has given its decision. The Court finds:

1. That all the railroad property in question is liable to taxation for State, county and municipal purposes.

2. The allegations of the bill as to fraud and prejudice on the part of the State Senate, acting as a board of equalization, are not sustained by the evidence.

3. That the county courts were authorized to value the railroad property, and were not limited by the valuations of the officers of the railroad companies as returned to them, and the assessment of values as made by the several county courts is sustained.

4. That the board of equalization acted as an original board of assessors in fixing the values of the railroad property.

5. That the board of equalization was not authorized by the statute of the state then in force (since changed) to act as a board of assessors.

It is therefore ordered that the companies pay the taxes as originally levied on the valuation fixed by the county courts, with 10 per cent. interest in lieu of all penalties, the cases being referred to a master to determine the amounts due. The State and county authorities are enjoined from collecting any amount beyond that fixed by this Court.

Most of the companies, under an order made by the Court some time since paid 60 per cent. of the amount claimed, so that the amount to be paid now is quite small.

East River Bridge.

At a recent meeting of the directors the expenditures up to April 1 were reported as \$5,973,885.70; outstanding liabilities, \$599,835.64. The ordinance appropriating \$2,666,666 to the bridge, being the proportion due from the city, has at last been passed by the City Council and approved by the Mayor, after much delay. This appropriation being secured, active work will at once be resumed on the bridge.

New Jersey Railroad Taxation.

The new railroad tax bill has passed both houses of the New Jersey Legislature and requires only the Governor's signature to become law. As heretofore noted, it provides for a tax of one-half of one per cent. annually upon the cost of road and equipment, such cost to be ascertained by sworn returns made by each company. In case of failure to make such returns, the value shall be estimated by the State Commissioner of Railroad Taxation. The law does not apply to the United New Jersey Company's lines, the lessee of those lines continuing to pay the annual tax of \$298,000 fixed by contract when the old transit duties were abolished. The lessee, the Pennsylvania Railroad Company, desired to come under the new law, which would have reduced the amount of tax; finally a compromise was made by which the branch lines, not covered by the contract-tax, were exempted from the law, such exemption to continue until the one-half of one per cent. on all the lines shall exceed the \$298,000 now paid.

Okeapeake & Ohio.

About \$27,000,000 of bonds have assented to the plan for the reorganization of this company, and the holders have voted unanimously in favor of the reorganization committee proposed, which consists of C. P. Huntington, A. A. Low, John Castree, A. S. Hatch, of New York, and Isaac Davenport, Jr., of Richmond, Va.

The Richmond *Whig* says of the recent decision of the Virginia Court of Appeals in the tax cases: "These suits were brought to impose upon the company the penalties prescribed for failure to make the returns of property, etc., required under the various tax bills for several years past. The Court below held that the company was exempt from taxation, that therefore the company was not rightfully required to make the returns demanded, and was, consequently, not liable to the fines sought to be imposed. The Court of Appeals—Judge Anderson delivering the opinion—reversed the Court below, and held that so much of the real and personal property of the company, with a fair proportion of rolling-stock, as lies east of Covington is not exempt from taxation, and that this property is liable to the real and personal property tax and the income tax imposed by the Legislature. The property from Covington westward to the Ohio River was exempted from taxation by the act of 1853 until its receipts reach 10 per cent. of

the capital stock of the line from Covington westward to the Ohio. At that time the Virginia Central Railroad Company was liable to taxation, and afterwards, when the Virginia Central became the owner of the Covington & Ohio Railroad, the terms of the contract only contained the exemption of the Covington & Ohio road, and did not extend the exemption to the Virginia Central. There is only about 16 miles of the road in Virginia west of Covington. The Court also held that the tax on the bonds of the company is good as to resident holders, but not as to holders domiciled in other States or countries, and that the State has the right to require the company to collect this tax and pay it over to the State when the reports prescribed are made. It is said that the cases will be appealed to the United States Supreme Court."

Canadian Pacific.

The description recently given of the route proposed for this road by Mr. Mackenzie in the Canadian Parliament is thus summed up by the St. John (N. B.) Telegraph: "Practically the route of the whole line from Thunder Bay on Lake Superior to Fort George on the bend of the Fraser River, a distance of 1,780 miles, has been settled. From Fort George to the Pacific coast, a distance of 250 or 300 miles, the route to be adopted is still undetermined, and the Premier points out with great clearness the natural difficulties which have prevented the settlement of the route in that quarter. It lies quite within the range of possibility that the terminus of the road on the Pacific may be at Dean's Inlet, which is considerably to the north of the most northerly point of Vancouver's Island, and should this be the case the people of Victoria will presently begin to apprehend that they have given themselves a great deal of concern with regard to a matter which only touches them very remotely. If the route to Dean's Inlet is feasible and if that harbor is sufficiently good, that route should certainly be adopted, as it is very much shorter than any other."

"From Thunder Bay or Lake Superior to the Red River the line has been located for some time, and its characteristics were long ago described in our columns. Of the section between Thunder Bay and Lac des Milles Lac, 22 miles, or about half the distance, have been graded at a cost of \$111,417. From Red River eastward towards Thunder Bay out of a section of 77 miles, 25 miles have been graded at an outlay of \$94,221. The branch from Pembina to Fort Garry is nearly completed in first-class style, and so far has only cost \$178,488. Such is the present state of the work on the Canada Pacific. West of Red River the line runs through an easy country, keeping well to the north, and touches the North Saskatchewan at White Mud River, some twenty miles to the south of Edmonton. From thence the line will run to Fort George, on the Fraser River, probably crossing the Rocky Mountains by the Yellow Head Pass, although there is a pass farther north, which, if time admitted, would probably be found more favorable."

Keokuk & Kansas City.

The failure to secure a loan in England appeared to have put a final extinguisher on the hopes of the completion of this road, but efforts are being made to revive the project, and it is proposed to complete it as a narrow-gauge line and to make connections with the projected Keokuk, Galesburg & Chicago road. The money required is to be raised from local subscriptions and on the transportation bond system proposed by the Illinois company, that is, by the issue of bonds receivable in payment of transportation when the road is completed.

In 1870 Clark County, Mo., issued \$200,000 bonds in aid of this road. Default was made in the interest and suit was recently brought to compel payment. The United States Circuit Court, however, has decided that under the charter of the company, which was the authority for the issue of the bonds, the County Court had authority to levy only a tax of one-twentieth of one per cent. to pay such interest. As this tax would produce only about \$1,750 annually, the prospects of the bondholders are not very good.

Coast Line.

The entire amount necessary to secure the proposed issue of bonds and to fund the floating debt has been secured. The amount needed was \$30,000 and the amount subscribed \$30,950. This will relieve the company from its embarrassments, and will prevent the summary measures threatened by the creditors.

Boston & New York Air Line.

The company has offered to iron and equip a branch to Colchester, Conn., if the town will grade it, and the proposal is now under consideration. The distance from the main line to Colchester Village is about seven miles.

Knoxville & Charleston.

This company has begun the survey of its proposed extension from Maryville, Tenn., to the North Carolina line, and announces that it is ready to begin construction as soon as it can have guarantees of connection at the State line within a reasonable time. The company has 16 miles of road in operation from Knoxville, Tenn., to Maryville.

Green Lick.

A survey is being made for an extension of this road from its present terminus at Scottsdale on the Southwest Pennsylvania road, to Tarr's, another station five miles distant on the same road.

Atlantic City & Camden.

A meeting of parties interested was held in Camden, N. J., April 6, to consider the question of building a narrow-gauge railroad from Camden to Atlantic City, to compete for a share of the very large Summer travel now carried by the Camden & Atlantic road.

South Mountain & Boston.

The instalments due on local subscriptions to the stock are being called in. It is said that work will soon be resumed on the grading near Deckertown, N. J.

Atlantic, Mississippi & Ohio.

The application for the appointment of a receiver in the foreclosure suit came up before the United States Circuit Court in Richmond, Va., April 7. There were present counsel for the trustees under the consolidated mortgage, who bring the foreclosure suit; counsel for the company, for the trustees of the various underlying divisional mortgages, for the cities of Norfolk, Petersburg and Lynchburg and the Attorney General, representing the State of Virginia. The counsel for the consolidated mortgage trustees asked for a postponement on account of the non-arrival of Mr. Collinson, agent for the foreign bondholders, who is daily expected and whose presence is necessary in order to complete arrangements for the protection of the divisional bondholders, and thus avoid embarrassments which would otherwise certainly result. The court postponed the case until May 2, with the understanding that everything shall remain in statu quo, and that repayments are to be made from the earnings of the road, except for necessary current working expenses.

Eastern.

The Committee on Railroads presented a report in the Massachusetts Senate, April 7, on the affairs of this company. The report details the history of the road and charges gross and reckless mismanagement. The report further says that the testimony indicates that the interest on the issue of bonds proposed under the reorganization plan can be paid from the earnings of the road, and that judicious sales of unnecessary prop-

erty can eventually reduce the debt to \$10,000,000. It concludes by recommending the passage of the following bill:

"No railroad corporation chartered under the laws of this Commonwealth shall hereafter issue any bonds, coupon notes, or other evidences of indebtedness payable at periods of more than twelve months from the date thereof, except as provided by the act of 1874."

Rabun Gap Short Line.

A company by this name has lately been organized under an old charter. Its object is to build the North Carolina section of the Blue Ridge Railroad, from the Georgia to the Tennessee State Line. At a recent meeting the board of directors was authorized to negotiate an agreement of consolidation with the South Carolina and Tennessee companies forming parts of the line, or with either of them.

Western Ohio Narrow Gauge.

Two companies by this name have filed articles of incorporation in Ohio. The first company, distinguished as No. 1, purposes building a narrow-gauge railroad from Xenia, O., north by west to Covington, about 40 miles. Its capital stock is to be \$600,000. The other company, No. 2, is to build from Covington to Van Wert, about 55 miles, and its capital stock will be \$600,000.

Boston & Albany.

The temporary bridges and trestles required to fill the breaks in the road caused by the giving way of the Lynde Brook dam near Worcester, have all been completed, and trains began to run through as usual April 6. The permanent restoration of the road will take some weeks to complete.

Seal Bluff & Concord.

It is proposed to build a narrow-gauge railroad from Seal Bluff, Cal., to Concord, about six miles. It is said the road can be very cheaply built and worked, and that it will give a considerable extent of country an outlet to a very good shipping port. An offer has been made to build and equip the road, if the people of Martinez will give \$15,000 toward it.

California Pacific.

A movement is on foot to secure an extension of the Vaca Valley Branch from Winters, Cal., northward into the Capay Valley. The company will probably do it if the people along the line will subscribe a fair amount of stock.

Mobile & Ohio.

In the United States Circuit Court at Mobile, Ala., April 8, Judge Woods denied the application to remove the present trustees and receivers, holding that the applicant, Morris Ketchum, is not now, as he claimed to be, a trustee under the mortgage, but that his removal from the trusteeship in 1863 was valid. A collateral suit was withdrawn in consequence of this decision.

A later telegram from Mobile, however, says that on April 10, Judge Woods granted an order for the renewal of the motion of Morris Ketchum, asking the removal of Messrs. Duncan and Elliott from the receivership. It is expected that argument on the motion will be heard in Mobile. Mr. E. L. Andrews, of New York, as counsel, has filed a motion in opposition to payment of floating-debt claims and asks for an order directing that the net earnings be applied to the payment of overdue coupons on the first-mortgage bonds.

Benton Harbor & Indiana.

An organization has at last been effected of a company to build this projected road. The road is to extend from Benton Harbor, Mich., by Berrien and Buchanan to the Indiana line, whence an Indiana organization will extend it to Plymouth, on the Pittsburgh, Fort Wayne & Chicago. The capital stock is to be \$300,000 and the gauge 3 feet 6 inches.

Toledo, Peoria & Warsaw.

Receiver Hopkins has filed his account for February and March with the Court, as follows:

Balance on hand Feb 1.....	\$2,298 28
Local freight account.....	\$152,532 26
Through freight account.....	59,194 38
Local passenger account.....	53,914 29
Car service account.....	12,982 19
Miscellaneous.....	10,071 64
Total.....	288,094 76
Freight, ticket and car service accounts.....	\$55,593 50
Bridge tolls and rents.....	7,516 57
Vouchers.....	124,112 65
Pay-rolls.....	94,120 95
	281,343 67
Balance, April 1.....	\$6,649 37

The receipts exceeded the disbursements by \$7,351.09 for the two months.

Delaware, Lackawanna & Western—Morris & Essex Division.

Four construction trains and three steam shovels are now at work on the Boonton Branch. They are employed in filling in the trestle approaches to the new tunnel through Bergen Hill, and on the second track between Whitehall and Montville. Two construction trains are at work on the new main line to the west of the tunnel, one east and one west of the Hackensack River. The work of building the piers for the Hackensack bridge has been slow, owing to the very difficult nature of the river bottom, but most of the trouble has been overcome and more rapid advance can now be made.

The question of raising the line through Newark is not decided and nothing has been said or done about it lately. No work has yet been done on the proposed new bridge over the Passaic.

East Berlin Branch.

This company was recently organized at a meeting held in Abbotstown, Pa. Surveys of the road are to be made at once and contracts let as soon as it is located. The line is from the Hanover Junction, Hanover & Gettysburg road at Red Hill, north through Abbotstown to East Berlin, about six miles.

Camden & Atlantic.

The new passenger depot at Atlantic City, N. J., will be one story high, 182 by 40 feet, with a tower 16 by 26 feet. It will contain two waiting rooms, each 40 by 50 feet, with a ticket office between; baggage room, 31 by 40 feet; express office, 20 by 14 feet and storage room, 20 by 40 feet. There will be, in rear of the house, three covered platforms, 565 feet long, giving room for the longest excursion train. A new freight depot, 196 by 16 feet, is also being erected.

Union Pacific.

An addition is being made to the round-house at Evanston, W. Ter., and it is understood that arrangements are being made to erect large repair shops there.

Blue Ridge.

A convention to assist this enterprise was held in Anderson, S. C., March 29, and continued in session three days. A large number of delegates were present from South Carolina, North Carolina and Tennessee. A number of speeches were made in favor of the construction of the road; resolutions to the same effect were adopted, and a committee appointed to prepare a report on the practicability of the line, the country through which it will pass, the probable traffic and other points of in-

terest. Statements were made as to the present condition and prospects of the Blue Ridge Railroad, of South Carolina. An adjournment was finally had to May 25, the convention to meet in Charleston, S. C., on that day.

Burlington & Lamoille.

The St. Albans (Vt.) Messenger says of this road, which is to connect Burlington, Vt., with the Portland & Ogdensburg road: "The iron for the Burlington & Lamoille Railroad, some 3,500 tons, has been purchased at Rome, N. Y., and is only awaiting an opportunity for shipment; over 30,000 ties are now scattered along the road bed and 15,000 more will arrive in Burlington as soon as the lake opens; three new locomotives—two for passenger and one for freight traffic—are being built at the Taunton Works, several passenger cars are already contracted for and work is now being pushed forward on a construction train in Burlington. The road bed is nearly completed, all the sections, save two, being nearly ready for the iron. The prospect is, altogether, very favorable for the early completion of the road."

Indianapolis, Peru & Chicago.

According to the report filed with the State Auditor of Indiana, this company has 172.67 miles of track, the road worked being about 160 miles. The right of way, depot and yard grounds comprise 1,254 acres of land. The equipment which it owns consists of 28 engines, 17 passenger and 8 baggage cars; 26 stock, 149 box, 146 platform and 25 hand cars.

Emmett County.

At a meeting of delegates from the various towns of this county held in Estherville, Ia., March 11, it was resolved that every inducement should be offered for the construction of a railroad through the county; that any parties building such a road should receive the county swamp land interest and be exempted from local taxes for five years. A committee was appointed to see what could be done. Emmett County is on the extreme northern line of Iowa and a little west of the centre of the State. It has no railroad.

Virginia Railroad Legislation.

The Virginia Legislature has, during its present session, passed acts, which have been approved and become law, incorporating the following companies:

West Point & Peninsula, a narrow gauge from West Point to Yorktown of Hampton.

Buchanan & Clifton Forge, the proposed line in extension of the James River & Kanawha Canal, to be built by the canal company.

Potomac, Fredericksburg & Piedmont, a reorganization of the Fredericksburg & Gordonsville.

Tazewell, Smith & Grayson, a narrow gauge line in the extreme southwestern section of the State.

Bristol Coal & Iron Railroad, to build a section of the proposed Virginia & Kentucky road.

Orange Court House & Harrisonburg, probably intended to cover the proposed new line of the Virginia Midland from Charlottesville to Gordonsville.

Surry, a short local line in Surry County.

Laws were also passed authorizing the working of penitentiary convicts on the Danville and New River and the Milton & Sutherland roads.

Missouri, Kansas & Texas.

The Receiver invites proposals for building 200 box cars for the use of the road. Proposals must be sent to his office in Sedalia, Mo., by April 20. Information as to specifications, patterns, drawings, etc., can be obtained of A. B. Garner, General Superintendent at Sedalia, Mo. Payment will be made in cash on delivery of the cars at St. Louis or Hannibal.

Frankfort, St. Louis & Toledo.

A company by this name has filed articles of incorporation in Indiana. The road as projected will extend in Indiana from Frankfort, Clinton County, through the counties of Clinton, Howard, Grant, Huntington, Wells and Adams, in the general direction of Toledo, for a distance of about 125 miles. The capital stock is fixed at \$1,250,000, and the company's office is in Frankfort, Ind.

Northern Pacific.

A large gang of men is now at work clearing and putting in order the Dakota Division between Jamestown and Bismarck, and regular trains will be running through to Bismarck next week.

The new bridge over the Mississippi at Brainerd, Minn., is completed and was tested April 1. First one engine weighing about 45 tons passed over without any noticeable deflection. Then two engines with nearly the same result. Finally, three engines, aggregate weight about 340 tons, moved across at a speed of from three to twelve miles per hour, causing a deflection in the 100-foot span of $\frac{1}{4}$ of an inch, and in 143-foot spans of $\frac{1}{3}$ of an inch.

The bridge, which is 615 feet long over all, is a Post truss combination bridge, of wood and iron. It was built by S. J. Wallace, under direction of Resident Engineer M. C. Kimberly, and replaces the temporary trestle bridge which has been in use since the destruction of the old Howe truss bridge, which, it will be remembered, gave way under a train July 27 last.

North Shore and Salisbury Branch.

The Legislature of New Brunswick having refused to extend the time set for the commencement of work on this road, the company has set a small force at work on the grading, so as to save its charter and subsidy.

Illinois Central.

A London dispatch says that Morton, Rose & Co. have negotiated the sale of £200,000 (\$1,000,000) 5 per cent. sterling bonds of this company.

The Land Department reports for March sales of 1,558.84 acres of land for \$11,620.76. The cash collected on land contracts was \$15,954.10.

The Traffic Department reports earnings for March as follows:

	1876.	1875.	Inc. or Dec.	P. C.
In Illinois, 707 miles.....	\$459,517 30	\$449,433 34	Inc. \$10,083 96	2.2
In Iowa, 402 miles.....	145,976 35	145,985 16	Dec. 108 81	0.1
Total, 1,109 miles.....	\$605,493 65	\$595,418 50	Inc. \$9,975 15	1.7

The Illinois earnings were \$650 per mile; the Iowa earnings \$363 per mile, the average for the whole line being \$546 per mile.

Little Rock & Fort Smith.

The sections of heavy rock cutting just west of Ozark, Ark., has been completed and put in good condition by the contractor. The iron train was put on the road April 1, and the work of tracklaying from Ozark westward is in progress.

Fort Smith & Arkansas Valley.

A company has been organized to build a railroad from Fort Smith, Ark., northwest up the Arkansas Valley to a connection with the Arkansas Valley Branch of the Kansas Pacific in Colorado.

Cumberland & Pennsylvania.

The Consolidation Coal Company, owner of this road, has already given evidence of its intention to contest the validity of the recent law reducing the charges for transportation of coal to one cent per ton per mile. The bills to the other coal companies for transportation were presented at the usual time, April 8, but they were all made out at the old rates, no notice

